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DIESEL RAILWAY TRACTION SUPPLEMENT

The April issue of THE RAILWAY GAZETTE *Supplement, illustrating and describing developments in Diesel Railway Traction, is now ready, price* 1*s.*

TO CALLERS AND TELEPHONERS

Until further notice our office hours are: Mondays to Fridays, 9.30 *a.m. till* 5.30 *p.m.*
The office is closed on Saturdays

ANSWERS TO ENQUIRIES

By reason of staff shortage due to enlistment, we regret that it is no longer possible for us to answer enquiries involving research, or to supply dates when articles appeared in back numbers, either by telephone or by letter

ERRORS, PAPER, AND PRINTING

Owing to shortage of staff and altered printing arrangements due to the war, and less time available for proof reading, we ask our readers' indulgence for typographical and other errors they may observe from time to time, also for poorer paper and printing compared with pre-war standards

Next Week's Budget

FINAL figures for the financial year give no cause for optimistic expectations in relation to next Tuesday's Budget statement by the Chancellor of the Exchequer. The national finances were balanced only by the addition of a further £2,190,000,000 to the country's debt. Total expenditure at £5,474,800,000 was £381,000,000 below the estimate, but that estimate was based on the probability that the Japanese war would not have ended. Revenue was £3,284,000,000, and this will be reduced next year by about £320,000,000, as a result of the reductions in taxation announced last October. The expected deficit will be at least £1,650,000,000, to which will have to be added any further commitments the Government may incur. The present administration has already shown quite clearly that it is more inclined to indulge in Socialist theory than to adhere to well-tried practical paths, and for this reason it is more than usually difficult to estimate the course the Chancellor may adopt. Nevertheless, the present restrictive influences on trade and commercial initiative must be causing concern with the Exchequer. The peak of the yield from E.P.T. is now well passed, and this impost obviously calls for review. The best that can be said of prospects of the Budget is that so little is expected of it that anything that is forthcoming will be welcome. It is clear from the Budget White Paper which was issued last week that the national income is about to decline unless productivity can be restored at least to its pre-war level, and the present burden of taxation is a potent opposing factor to this being achieved.

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End of Department of Overseas Trade

As a result of the Department of Overseas Trade (Dissolution) Order, 1946, which was made on March 20, the Department of Overseas Trade ceased to exist as a separate Government department at the end of March. Since April 1 its functions have been taken over by the newly-formed Export Promotion Department of the Board of Trade, to which the staff of the Department of Overseas Trade has been transferred. The former Secretary of the Department of Overseas Trade, Mr. H. A. Marquand, has been appointed an additional Parliamentary Secretary to the Board of Trade, with the title of Secretary for Overseas Trade. As soon as circumstances allow, the Export Promotion Department is to be housed with the rest of the Board of Trade Headquarters at Millbank. Until that can be done, it is remaining at the offices of the Department of Overseas Trade at 35, Old Queen Street, S.W.1. As was explained by the Prime Minister on December 17, the object of the new arrangements is to improve Government services to overseas trade. The new Export Promotion Department is to continue to afford all the facilities for exporters which were previously available at the Department of Overseas Trade.

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Overseas Market Information for Exporters

The Board of Trade has discussed with the British Export Trade Research Organisation how best the interests of British exporters may be served in the matter of information relating to overseas markets, and as a result a working arrangement has been reached between the Board of Trade and B.E.T.R.O. This provides that as soon as B.E.T.R.O. has been able to engage the necessary trained personnel for positions abroad, and to send out special investigators, it will supply detailed reports which will supplement the general reports which are made by the Commercial Diplomatic Officers and Trade Commissioners. To ensure the closest possible working between the Government services and B.E.T.R.O. and to avoid duplication of effort, as well as giving maximum service to exporters, a joint committee of the Board of Trade and that organisation is being set up to review results periodically, and to arrange forward programmes. The British Export Trade Research Organisation was set up last year, with the support of a number of leading industrialists, to carry out the work its name implies, and to make the results available to individual companies connected with the export trade which might wish to avail themselves of it

British Railway Investments in Uruguay

Only slight variations, but those in the right direction, are shown in the statistics for 1945 relating to British investments in Uruguay, which have been compiled by *The South American Journal*. Of a total of £43,819,938 of British money invested in Uruguay last year, interest of £1,306,625, or 2.9 per cent., was received. This compares with 2.8 per cent. for 1944. The amount of capital receiving no return was £16,000,372 for 1945, against £16,857,199 for 1944. In Government bonds £16,756,793 was invested, and the interest received was £586,487, or 3.5 per cent., the same rate as for 1944. In this category no investment was unremunerated. The payment of a year's interest on account of arrears on the 4½ per cent. debentures of the Central Uruguay Railway, resulted in a substantial increase in the amount paid on capital invested in the railway section. Whereas in 1944 there was £14,220,072 invested in Uruguayan railways and only £18,144 or 0.1 per cent. was received in interest and £13,857,199 was unremunerated, in 1945, on £14,513,145 invested, interest amounting to £69,888 or 0.4 per cent. was received, but there was still outstanding £13,000,372 without interest.

* * * *

The Mechanicals to Absorb the Automobiles

Such progress has now been made with the merger proposal whereby the Institution of Automobile Engineers will be merged with the Institution of Mechanical Engineers, that only legal formalities remain to be completed. The members of both Institutions have signified their approval of the step, and the Institution of Automobile Engineers has now been formally invited by the President of the Institution of Mechanical Engineers, on behalf of his Council, to amalgamate with that Institution. Both Institutions will need to present a petition to the Privy Council to authorise the amalgamation; this step is essential, as both Institutions are incorporated by Royal Charter. Obviously, there will be a lapse of time before these steps can be implemented, and, during this period Mr. Frank G. Woollard, the President of the Automobiles, has informed his members that the activities of their Institution will proceed on normal lines. In making this announcement he said that negotiations between the respective Councils had proceeded in perfect harmony, and he was satisfied that the amalgamation would be to the mutual advantage of the members of both Institutions. The Institution of Automobile Engineers was founded in 1906, and incorporated by Royal Charter as recently as 1938. The main criticism that we have heard of the proposals is that it may bring within the fold of the Mechanicals certain members of the Automobiles admitted in earlier years whose technical qualifications are below the current stringent requirements of the Mechanicals.

* * * *

The Ideal Fishplate Steel

A matter concerning railway permanent way in which there has always been a considerable divergence of opinion among engineers has been the quality of the steel used in the manufacture of fishplates. The stresses sustained by a rail-joint are severe, and the constant flexure of the plates under trains rules out the mild steel of earlier years, which suffers from fatigue to such an extent that plates of this type tend to fracture even more readily than those of a higher carbon composition; in particular, the harder steel of the rail-ends tends to cut into the plates, and to produce indentations from which cracks start. In the past another school of engineers favoured plates rolled from the same steel as the rails, but these tend to have the worse effect of cutting into the rails and producing rail-end failures, which are more costly than failures of fishplates. In recent years there has been a leaning towards the use of heat-treated fishplates in the hope of obtaining increased toughness without excessive hardness, but the carbon content has been increased to get the best value from the heat treatment, with the result that some of the plates have been even harder than the rails and have accentuated rail-end fracture trouble. A more logical development has been the medium manganese fishplate used on the L.N.E.R., with from 0.90 to 1.10 per cent. manganese in place of the 0.80 per cent. maximum of the B.S. Specification, but without reduction of carbon it is questionable if these plates also, though tougher than the previous standard, are not harder than they need be. The aim in the fishplate tensile test should be to obtain the maximum possible percentage of elongation and reduction of area in conjunction with an adequate breaking strength.

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Double-Deck Passenger Coaches

Some of the most capacious passenger coaches yet designed are on order for the Long Island Railroad of the United States. The Long Island brings electrically-operated trains into the Pennsylvania station with a frequency which at its maximum reaches 16 trains in 15 min. during the morning rush hours, and it is neither possible to reduce this headway nor to contemplate lengthening platforms or altering the signalling to deal with longer trains. After earlier experiments in 1932 and 1938, in which three such coaches were built experimentally, the Long Island now has under construction ten double-deck vehicles, each of which will be 80 ft. long and will provide seating for 136 passengers. There are two tiers of seats, of which the lower tier has its floor 14 in. below the level of the centre aisle, and the upper tier is correspondingly raised; each tier has its own row of windows. The U.S.A. loading gauge, which permits building to a height of 15 ft. 6 in. above rail, has made such a design possible. The cars are to be of aluminium construction, and will be in pairs, the motor-equipped car weighing 40 tons and the trailer 35¼ tons (of 2,240 lb.), as compared with the 51 tons of the previous standard 64-ft. cars of conventional design, each of which seats 80 passengers. By the specialised design, and the materials used, the weight of stock per passenger carried will be reduced from 0.64 to 0.28 ton. The coaches are being built in the shops of the parent Pennsylvania Railroad, and are expected to cost about $900,000.

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Today's Indian State Railways

The recent change in the official designation applied to all railways owned by the Government of India from "State" to "Government Railways," reminds us that there are, however, some 6,800 route-miles of line in the sub-continent that can still correctly be termed "State Railways." These are owned—and in almost all cases worked also—by the sovereign Indian States, ruled by the hereditary princes. The larger State systems are H.E.H. the Nizam's State Railway in Hyderabad (totalling over 13,000 miles of line), the Jodhpur (1,125 miles), Bikaner (883 miles), Mysore (748 miles), Baroda (736 miles), and Gwalior (about 300 miles) State Railways. The administrations of these and of the smaller systems are almost all enterprising and anxious to launch out on new rail extensions, co-ordinated road services, and all forms of improved transport that will assist in developing their States. To this end considerable mileages of railways have been built by various States for specific purposes, such as opening up forests in Cochin and the Kolar goldfields in Mysore, and to connect new harbours and ports, mines and quarries with existing lines. The convenience of passengers of all classes also is studied by all the administrations, and improved amenities are constantly being provided. The first railway in India to provide electric fans in third class carriages was the Nizam's. It was also the pioneer in road transport and now has over 300 buses and 200 road goods vehicles serving over 4,000 miles of roads. Gwalior also has a remarkable network of bus services. In 1943-44 the Mysore State Railway carried over 11,700,000 passengers, and in 1944-45 the Nizam's dealt with over 17,000,000. Capital invested in the latter system alone is about £12,000,000.

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Where Railway Engineering Stands Today

For his Presidential Address to the British Section of the Société des Ingénieurs Civils de France on March 29, Mr. Conrad Gribble, Deputy Chief Civil Engineer, Southern Railway, took as his subject "Railway Engineering in Great Britain in the First Half of the Twentieth Century." Mr. Gribble surveyed railway engineering, dealing first with permanent way and bridges as the chief responsibility of the engineer. Permanent way, he said, had not been materially altered in any country of the world, but he thought it might be economical to use a heavier and stiffer rail, with much larger sleepers, possibly of reinforced concrete, to provide a track that would require only very occasional inspection. Bridge building had

seen no outstanding development except in certain special instances, such as the completely articulated link span connecting ship and shore at the Dover train ferry terminal. Electric arc welding was gradually becoming a serious competitor to riveting for bridge work. The modern engineer had a great advantage over his forebears in the range of power-operated plant now available. Engineers ought to appreciate also the experience placed at their disposal by the voluntary work of technicians and institutions in evolving engineering standards and codes of practice.

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Good Lights Essential

The collision at Woking, Southern Railway, on November 10, 1945, when a signal light was proved to be almost out, has emphasised the difficulties experienced during the war in obtaining reliable working. Colonel A. C. Trench, whose report is summarised elsewhere, recommends that the pre-war quality oil be restored as soon as possible. In this we heartily concur. During the blackout a reduction in the power of signal lamps —though even then undesirable—was not such a serious matter as it is now, when other lights have reappeared to interfere with them and produce distracting effects. We cannot get back too soon to the best possible lighting and particular attention should be paid to locations where colour-lights can tend to drown nearby oil lights. One can see constantly, too, signal lights which should form one uniform pattern showing widely varying degrees of brightness, so that the pattern never appears complete to an observer at any one point. This is decidedly unsatisfactory. We have no desire to disparage the excellent work done in this field, but we must confess to feeling that there is still room for improvement in signal lighting and that greater attention should be given to screening adjacent lights, especially at stations, to render the signals more conspicuous.

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Signal Engineers, Like Doctors, Differ

One thing that can be said with certainty regarding the relative merits of the power interlocking frame and the panel apparatus is that signal engineers of ability and wide experience can be found expressing totally opposite views thereon. In these columns we are not concerned with advocating either system. We will, however, venture to say that as yet no discussion on this subject that we have listened to, in meetings or elsewhere, has included a consideration of some items which we consider need setting out in complete detail under several asjects—financial, technical, and operating, to mention no others —before any truly scientific comparisons can be made. No doubt those signal engineers who entertain strong opinions on the matter have satisfied themselves that they are justified in recommending a particular practice to their railway; but there is the possibility, as it appears to us, that neither system will displace the other everywhere.

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Working 1,000-ton Trains at 100 m.p.h.

A steam locomotive capable of working a train of 1,000 tons at 100 m.p.h. is a phenomenon of note, even in 1946. Yet the remarkable 4-4-4-4 passenger locomotives of the Pennsylvania Railroad, described elsewhere in this issue, in trial runs have demonstrated this speed capacity and even more. No. 6111, hauling a 16-car train of 1,120 tons (1,000 tons of 2,240 lb.), has averaged 102 m.p.h. over 69 miles of favourable grades in the course of a single journey; No. 6110 has completed precisely half the 280-mile run from Crestline to Chicago at a mean speed of 100 m.p.h. with 1,025 tons (915 tons of 2,240 lb.) behind the tender. How successful this design has been may be measured by the fact that the requirements on which it was based called for the haulage of no more than 880 tons (785 tons of 2,240 lb.) at this speed. These loads, incidentally, are independent of the weight of the 16-wheel tender attached to the locomotive, which is 193 tons in full running order, or the equivalent of nearly three vehicles of heavy modern American stock. The principal features of the design are the divided drive, so that the locomotive has the equivalent power and adhesion of a 4-8-4 locomotive without the heavy moving parts of a 2-cylinder engine of that type, and the use of the Franklin system of steam distribution, with poppet-valves, to which the exceptional power output involved in the feats of performance mentioned above must be largely attributed.

Argentine Railways and the Balance of Trade

HITHERTO, schemes for the repatriation of the ownership of the Argentine railways have arisen usually out of efforts to avoid the very heavy losses on exchange which are, by far, the most important impediment in the way of the revitalisation of the lines. Indeed, unless means can be found of relieving the companies from such financial burdens, there will be little hope of raising fresh capital in Great Britain to enable long-overdue modernisation plans to be put in hand.

Recent messages from Buenos Aires suggest that the whole subject of the future ownership of the lines willl be approached from a quarter which, though not new, has not been mentioned for some time. What are described as informed sources have made known that the Argentine Embassy in London has been instructed to sound the British Government as to the feasibility of evolving an acceptable scheme under which the blocked sterling balances accumulated in London by Argentina during the war would be used for the purchase of the British-owned railways. The balances are believed to be in the neighbourhood of £100,000,000, and, though insufficient to meet the total purchase price, nevertheless would be adequate foundation on which to formulate a plan for the sale of the lines, partly in cash and the remainder in Argentine Government sterling bonds. An idea of the size of the transaction involved may be gained from the following figures :—

Capital cost of the lines and equipment, in sterling, as shown in the annual accounts of the companies	£254,000,000
Agreed sale price under the Mitre Law, that is, the recognised capital, in pesos, plus 20 per cent., converted to sterling at 13.50 pesos to the £—the Argentine Government buying rate for sterling	£235,000,000

The inability of Great Britain to ship goods to Argentina in payment of meat and other imports during the war years was the cause of the accumulation of sterling balances. It will be evident that the mere change of ownership of an investment and the thawing of frozen sterling balances will not, by themselves, solve the real problem, which is the re-establishment of normal trading between the two countries with the least possible loss of time. Great Britain is in urgent need of meat, maize, wheat, hides, and quebracho extract, as well as the many other less important, but no less indispensable, products from Argentina, if the former standard of life in these islands is to be re-established. It is equally urgent that the industrial activities of the people of Great Britain should be redirected from war to peacetime pursuits so that exports to Argentina of coal, iron, and steel manufactures and equipment for land and air transport services may be resumed with the minimum of delay. Residents in Argentina have experienced considerable discomfiture through lack of coal and manufactures which are obtainable only from overseas, and it is in the best interests of both countries that manufacturers in Great Britain should be enabled to recommence shipments on a pre-war scale at the earliest possible moment.

The magnitude of the recovery which lies ahead may be appreciated from the following figures of British-Argentine trade in 1937, a normal peacetime year :—

Imports from Argentina	£58,000,000
Exports to Argentina	20,000,000
Adverse balance	£38,000,000

In the past, the adverse trade balance was rectified by invisible exports from this country, such as shipping freights, insurance and banking services, and interest on investments in Argentina owned by residents in Great Britain. It is the last-mentioned item which has steadily diminished in recent years, and, with the policy in Argentina to dispense with capital borrowed abroad, the few remaining sources of investment income will tend to disappear. A further check to the revival of British investments overseas is likely to arise from strict control in Great Britain over the direction of investments in general, and the machinery for the supervision of capital issues is likely to be strengthened rather than relaxed.

Such applications for new capital as may emanate from Argentina, without doubt, will receive sympathetic consideration, but the fact cannot be disregarded that the demands on the capital resources of the London money market from the countries of the British Commonwealth of Nations and Empire will be large, nor is the volume of finance required to rebuild Great Britain likely to be overlooked when assessing the degree of priority to be acco ded to would-be borrowers. Hence, it may well be that the conversations between Governments which, it is reported, are contemplated, even if they have not commenced already, will

postulate the capitalisation of Argentine development schemes from Argentine sources primarily, supplemented by a certain amount of new money from this country to facilitate the export of manufactures of the kind which are usually described as capital goods. An indispensable preliminary will be the revision of the financial structure of the railways, and stockholders will watch with the closest interest any plans to purchase the lines. Whether the negotiations will be carried on by the Governments, in the first instance, it is not possible to foretell, but there is every indication that, in view of the recent general elections held in Argentina which resulted in the return of Colonel Peron, and the expiry of concessions under the Mitre Law at the end of the current year, investors will not have to wait long before the future of their holdings will be determined.

From the standpoint of the resumption of trade between the two countries, the reconstitution of the railways on a sound financial basis is certainly to be commended. Under existing conditions, the companies will be quite unable to attract new money to the industry, without which manufacturers of railway equipment in this country will be prevented from meeting Argentine needs, which are very real. The recognition of this impediment to much-needed resuscitation of Anglo-Argentine trade is not the least of the reasons which underlie the frequency of the reports which circulate nowadays of the impending sale of the railways to the Argentine Government.

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Queensland Government Railways

THE report of the Commissioner for the Queensland Government Railways for the year ended June 30, 1945, states that with the centre of the conflict in the Pacific moving further from the shores of Australia, the demands made on the Queensland Railways during 1944-45 for the conveyance of goods were less than those in 1943-44. Passenger journeys, however, showed a substantial increase and once more established an all-time record. The gross ton mileage in 1944-45 was 4,385,202,055, a decrease of 556,767,613 compared with 1943-44. The net (contents) ton miles amounted to 1,239,133,955, being 135,825,450 less than in the preceding year. Traffic train miles aggregated 17,373,685, or 2,170,675 below the figure for 1943-44. The gross ton miles per traffic train mile in 1944-45 reached the record figure of 265.35, as against 263.53 in the previous year.

Passenger journeys on the Queensland system totalled 38,534,318, the highest figure yet recorded, and an increase of 893,166 over the passenger journeys in 1943-44. Passenger journeys on the Queensland lines, and on the uniform gauge railway (excluding those passengers who transhipped from one gauge to another to complete their journeys) aggregated 38,962,040. Gross earnings for the year amounted to £13,225,617, being £2,434,274 less than in 1943-44. Working expenses amounted to £11,295,230, a reduction of £1,424,007 on the figure for the preceding year. The earnings per train mile were 15.23s. and expenditure per train mile 13s. The operating ratio was 85.40 per cent. Net earnings were £1,930,387, or £1,010,267 less than in the previous year. This represented a return on gross capital of £4 11s. 10½d., and £4 14s. 11d. on open lines capital. The interest on gross capital, calculated at 3.789 per cent., amounted to £1,592,490. After deducting this amount from the net earnings, the surplus for the year amounted to £337,897. Working results for the past four years are given below :—

	Passengers carried	Goods tonnage	Earnings	Working expenses	Net earnings	Percentage of expenses to earnings
			£	£	£	
1941-42...	11,642,309	5,581,292	11,263,807	8,314,210	2,949,597	73·81
1942-43...	14,359,129	6,231,801	17,148,196	10,993,842	6,154,354	64·11
1943-44...	17,492,824	5,997,811	15,659,891	12,719,237	2,940,654	81·22
1944-45...	18,081,234	5,798,476	13,225,617	11,295,230	1,930,387	85·40

The coal supply to the railways at the present time cannot be regarded as satisfactory. The position is slowly but steadily deteriorating, and consideration will again require to be given to the question of using a percentage of firewood in locomotives unless the output of coal is improved.

In reviewing the war effort of the Queensland Railways, the report says that the great and sudden increase in traffic took heavy toll of the department's locomotives and rolling-stock. Engine mileage rose from 16,081,602 in 1938-39 to 24,309,794 in 1942-43. Goods wagons with an average mileage of 29 per day were called upon to averag 53 per day, and few railway wagons in the world exceed that figure. The average for American wagons in 1939 was 36 miles. An inevitable concomitant of such abnormal mileage was deterioration in condition, particularly of locomotives and rolling-stock.

Regarding the outlook, the report states that it is inevitable that in the near future railway transport will be subject to much greater competition from air transport than ever before. Already there is evidence of growing air movement, and many road services which were temporarily banned during most of the war period have now been relicensed. A substantial volume of transport previously handled by coastal vessels, which was diverted to the railways because of wartime shortage of shipping, is certain to be conveyed by sea when ships become available : it is apparent that unless some extraordinary new development, of which there is as yet no evidence, occurs, railway revenues will decline seriously, whereas expenditure cannot be reduced in the same ratio.

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Industry and Research

AT the recent conference on industry and research organised by the Federation of British Industries, which is reported on page 392 of this issue, speakers stressed the importance of increasing our scientific manpower in order to meet the growing demands of industrial research. Sir Ernest Simon said it was generally agreed that our aim was to double the number of science and technological graduates turned out by the British universities in the next ten years, and the secondary schools must produce sufficient students of the necessary quality ready for entry to our universities. At the same time, salaries of university scientists should be comparable with those paid by industry and in the Government service. Sir Robert Robinson called for more universities with scientific departments and more technical colleges, and said he hoped that the committee appointed by the Government to report on scientific manpower would indicate precise steps to be taken, and not just leave the matter open for further discussion. A note of criticism came from Sir John Anderson, who expressed the opinion that there are grave defects in our higher educational system. The higher teaching of science he considers is directed too exclusively to the creation of specialists, and specialists are too often launched on the world with an inadequate general grounding. He called for every effort to make good a manpower shortage which would last for, maybe, ten years.

Only those countries which apply the latest results of science vigorously and continuously will hold their own in the stress of international competition which lies ahead. British industry realises this fact. Figures given to the conference by Sir William Larke from a recent survey show that there are at the present time 9,000 graduate scientists engaged on research and development in British industry, and those industries which contributed to this survey propose to increase their scientific staff by no less than 25 per cent. in the next two years. Also, there are now 30 research associations working in collaboration with the Department of Scientific & Industrial Research, their total annual expenditure being more than £1,000,000, which it is proposed to double in the next five years. Bearing in mind that the competitive power of British industry must be firmly secured in order to ensure a reasonable standard of living, the conference was unanimous in calling upon every industrial concern to make the greatest possible use of scientific knowledge as soon as it became available. Every industrial unit, moreover, should include at least one qualified official with the specific duty of following general scientific and technical developments and literature. The application and use of science in daily industrial life will require the progressive growth of industrial research facilities, and every industrial concern must make the fullest use of its appropriate research association and, where practicable, establish its own research department. One of the essential factors in pursuing these aims is, of course, the provision of increased facilities in educational establishments, and another, the full collaboration of the Government in giving the highest priorities to the provision of the buildings and personnel essential to research in industry.

Sir Harold Hartley reviewed briefly the way in which scientific research has made its contribution to the progress of

the L.M.S.R. and had gradually become in integral part of that organisation. He, also, urged firms having only a small turnover to employ at least one man with scientific training to watch their activities and keep in touch with outside developments. This point was also stressed by Mr. Herbert Morrison, who asked every industrial firm, large or small, seeking to expand its production, to get in touch with the Department of Scientific & Industrial Research.

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French Railway Reconstruction Achievements

RAPID progress was made by the French railways during 1945 in restoring traffic after the disastrous effects of the occupation. Liberation left the railway system in a state of almost complete paralysis, and although by January, 1945, only 4 months later, the engineers had got traffic moving again on most lines, the situation was far from reassuring. There were at that time only 5,800 locomotives in service out of a pre-war stock of 17,000; 153,000 goods vehicles out of 460,000; and 10,000 passenger vehicles out of 36,000. Although out of the 2,600 bridges and viaducts destroyed or badly damaged, 1,244 had been restored to traffic, in most cases the repairs were temporary and involved severe speed restrictions. In addition, traffic working was extremely difficult, because of the state of many large stations, marshalling yards, locomotive and rolling stock workshops and depots, as a result of continuous and crushing attacks by the Allied Air Forces, and also the extremely severe winter of 1944-45, not to mention the shortage of all essential railway supplies, particularly fuel, lubricants, and other stores.

Far from being discouraged by this state of affairs, the railways not only continued but improved upon their already magnificent feats of repair and reconstruction. After having restored to traffic those lines most needed by the Allied armies and for feeding the civilian population, they proceeded to do the same on the great trunk lines between Paris and the principal cities and towns in the provinces, including the seaports. By the end of 1945, the bridges repaired permanently or temporarily had reached 2,300. Out of 70 tunnels blocked, 45 had been cleared and repaired, and 2,250 miles of track with 8,500 items of track apparatus had been replaced. All main lines had been re-opened and continuity restored to the whole system.

With regard to rolling stock, those workshops which were able to improvise buildings and equipment among their ruins got to work with the help of outside firms to repair steam locomotives first of all. This was carried on throughout the year without relaxation, and to such good purpose that at the end of December, 1945, the number of engines in service had risen to 8,650. At the same date the United States had delivered 130 out of the 700 "Liberation" Class 2-8-2 locomotives ordered by the French railways and designed by their engineers. In addition, 1,020 of the 3,300 locomotives looted by the Nazis had by then been recovered. Repairs to passenger and goods vehicles proceeded at the same encouraging rate. By the end of December the stock of goods wagons had increased to 270,000, and 1,500 passenger coaches were returned to traffic. A further 1,860 passenger vehicles were recovered from occupied Germany.

Simultaneously locomotive and train-mileage showed great improvement. The average journey per locomotive increased progressively from 33 miles in January to 45 in April, 52 in July, 53 in October, and finally 62 in December. Monthly figures of train-mileage followed the same rising trend. In the case of passenger trains they rose from 800,000 miles in January to 3,200,000 in May, 4,200,000 in July, and 4,700,000 in December. For goods trains, the corresponding figures were 2,200,000 in January, 5,100,000 in May, 6,100,000 in July, and 7,400,000 in December. In January, 1945, the imperative needs of military traffic and severe weather conditions made it necessary to withdraw practically all passenger services, and it was not found possible to restore them before the month of March. From that time onwards, however, there was a rapid improvement. In May, by reverting so far as was then possible to pre-war traffic working, the railways were able to carry 19,000,000 passengers on main-line trains and 28,000,000 on suburban trains. In July, holiday traffic brought the monthly total of main-line passengers up to 26,000,000. The traffic for September actually exceeded that of the corresponding month in 1938—1,814,000,000 passenger-miles in 1945 against 1,630,000,000 in 1938.

Fully occupied as they were with their efforts to improve internal traffic, the railways nevertheless played their part in the restoration of some of the pre-war international railway communications between the countries of Western and Central Europe. On January 15, 1945, the service between Paris and London *via* Dieppe and Newhaven was resumed after a break of 4½ years. Services between France and Switzerland were restored on May 7 to Berne, and on July 1 to Geneva. During the summer months trains were running again to Belgium (Liége and Brussels), the Saar, Germany, and Austria (Vienna and Innsbruck). The railways played a very important part in the task of feeding the population of the principal large towns and cities of France, particularly Paris. In achieving such a gratifying record of progress despite difficulties of all kinds and an extreme shortage of supplies and materials, the railways of France have made an important and indispensable contribution towards the economic recovery of the country.

* * * *

Victoria Bridge, Montreal

ON another page in this issue we publish an article descriptive of the restoration of the great Canadian National Railways Victoria Bridge over the St. Lawrence outside Montreal. The history of this bridge is of no little interest, as it was built as long ago as 1854 to carry a single line of railway, and then had iron tubular spans 16 ft. wide and 18 ft. 6 in. to 22 ft. high. There were and are still 24 spans of from 242 ft. to 247 ft. in length and a navigation span of 330 ft.; the original spans weighed 9,044 tons. They were supported by masonry piers and abutments composed of an outer coursed ashlar shell of limestone blocks, each weighing from 5 to 20 tons, set in lime mortar, and a hearting of irregular stones also laid in lime mortar. The downstream ends of the piers were parallel to the centre line of the bridge and had a normal batter, but the upstream ends had inclined cut-water faces. The abutments were of similar materials and construction, but are remarkable for the fact that they extend out from the river banks for several hundred feet at each end of the bridge. Though the length of the bridge between abutment faces is 6,592 ft.—virtually 1¼ miles—the overall length is 9,144 ft., nearly 1¾ miles.

In 1898, it was decided to rebuild the bridge to carry not only a double line of railway, but also a roadway and a single-line tramway. Pin-connected through truss spans were substituted for the old iron tubular superstructure: the double line runs between the trusses; the roadway is cantilevered out from the trusses on one side and the tramway on the other. At the present time, therefore, the overall width of the superstructure is 66 ft. 8 in., and its weight is 22,000 tons. To support this width of decking, the tops of the abutments and piers had to be widened by building up the masonry vertically from the cut-water faces on the upstream side without adding to the overall width of the sub-structure.

The deterioration of the masonry and the methods used in restoring it are explained in the article. It is significant that the work will have taken about three years by the time it is completed. Other indications of its magnitude are: (1) That the volume of special grout used amounted to about 12 per cent. of the masonry grouted, (2) that in one of the 24 piers alone some 9,000 sacks of cement were required, (3) that about 15 per cent. of the facing blocks will have been replaced, and (4) that 230 blocks had to be renewed in a single pier. On the other hand, it is estimated that replacement of the piers and abutments would have cost more than ten times the total expenditure involved in the work at present in hand. Replacement would, moreover, almost certainly have necessitated some interruption of traffic on this vitally important link between the parts of the system north and south of the St. Lawrence. The Canadian National Railways engineers and the contractors, therefore, are to be congratulated on the unqualified success, from every point of view, of their bold venture now nearing completion.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

The Haywards Heath Accident

Small Arms Schools (I), Saugor,
Central Provinces,
India. March 18

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I read the account and correspondence on the Haywards Heath accident with the greatest interest. Three things struck me particularly. First, the fact that the driver booked on as yard pilot and was switched to this job at short notice—a route on which of late he had not been over much. Secondly, the fireman was a mere boy. Thirdly, the time was the early hours of the morning; when it is generally admitted a man is at his lowest ebb.

Having regard in particular to the first and third of these facts, surely some active and definite action should have been taken to ensure he *was* aware of the situation at Haywards Heath. In short, whoever allotted him the job was surely responsible for ascertaining he did know the facts. Why blame the driver?

Yours faithfully,
G. E. THORNTON,
Lt.-Colonel

[The Ministry of War Transport report on the accident at Haywards Heath, Southern Railway, was dealt with in our December 14, 1945, issue.—ED. *R.G.*]

Southern Railway Electrification

Hove. March 9

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—The summary of Mr. S. B. Warder's paper entitled "The Electrification of the Southern Railway" on p. 263 in your issue of March 8, has, I am sure, evoked widespread interest.

There is, however, one detail in it which seems to call for clarification. In your excellent supplement on the Southern Railway electrification extension, dated December 30, 1932, it is stated on p. 31 that each express type motor coach is equipped with four 225-h.p. motors, whereas in your report on Mr. Warder's paper they are said to be 275-h.p. motors. There may be any one of three explanations of this: (1) The original motors may have been replaced by slightly more powerful ones when renewal was necessary; (2) the original "Brighton" express motor coaches may still have 225-h.p., though the later "Portsmouth" coaches may be fitted with 275-h.p. motors; or (3) one of the figures may be incorrect. In any case, it will be of interest to learn what is the explanation.

It would also be of general interest if you could give the relative gear ratios of (a) the express and (b) the semi-fast type motor bogies.

Yours faithfully,
BRIGHTON ELECTRIC

[Our correspondent's suggestion (3) is the correct one, the horsepower of the six-coach and five-coach fast trains and the four-coach trains having been shown by a typographical error as 275 h.p. instead of 225 h.p. as stated in Mr. Warder's paper to the Southern Railway Lecture and Debating Society. The gear ratios are: Suburban type, 275 h.p. motor, 21:59, express type, 225 h.p. motor, 23:57.—ED., *R.G.*]

Royal Engineers War Memorial Fund

Regimental H.Q., R.E.,
Gibraltar Barracks,
Aldershot. March 25

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I ask for the hospitality of your pages in order to publish an appeal for subscriptions to the Royal Engineers War Memorial Fund. I made an appeal direct to the troops in May, 1945, but by that time many men had left the Service and had returned to civil life who had probably never seen my appeal, and it is possible that some of your readers may be included in their numbers whom I could not approach by any other method than through your pages.

Over 400,000 officers and men served as Royal Engineers between 1939 and the present day, of whom nearly 10,000 laid down their lives. The object of the war memorial which I wish to provide is to commemorate the contribution made by my corps to victory and to perpetuate the memory of those gallant officers and men who gave their lives in its achievement.

The activities of my corps during the war included land mine clearance, road, railway and bridge building in every theatre, the building of the Mulberry Harbour, leading the assault on the Normandy Beaches and in the subsequent amphibious operations in Europe, and, last but not least, bomb disposal in the United Knigdom, a dangerous service which has undoubtedly saved many human lives and much property.

The type of memorial which my committee has in mind is to make provision for those who have been disabled or otherwise suffered physically through the consequences of the war, by the provision of cottage homes, a convalescent home, or endowed beds in hospitals: the exact type will be settled only when we know the amount of money which is available.

Those who wish to contribute to the war memorial of the Royal Engineers should send their subscriptions to:—

The Hon. Treasurer,
Royal Engineers War Memorial Fund,
Gibraltar Barracks,
Aldershot, Hants.

by whom they will be gratefully acknowledged.

Yours faithfully,
J. R. E. CHARLES,
Chief Royal Engineer

Courtesy Aids Service

London, N.W.3. March 29

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—The L.P.T.B. poster at the bottom of the first column on p. 344 of your March 29 issue is hard to read, as it is displayed at some stations. The poster should be put on a level with the eyes of passengers of average height, and even then it doesn't attract enough attention. Six requests are too much for one small bill.

Yours faithfully,
HEATHMOUNT

Fast and Slow Lines

Cambridge. April 1

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—The diagram on p. 357 of your March 29 issue brings out one weakness of the L.M.S.R. If, as on the old G.N.R., the up lines had been together on one side and the down fast and slow on the other side, the crossing from the fast to the slow up line would have been easier. From a day-to-day working point of view, the layout shown in your diagram must cause a lot of delay, as the down slow is out of action when a train has to cross from the up fast to the up slow.

Yours faithfully,
EAST ANGLIAN

Lessons from Accidents

390, Wakefield Road,
Huddersfield. April 1

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—Brigadier W. G. Tyrrell calls attention to the fact that there is such a thing as "control at the site" (of a necessary speed-reduction). That being so, the question as to whether a driver has seen a printed notice of a speed restriction is totally irrelevant. After all, conditions may arise, a few minutes before a train reaches a junction, that necessitate an unforeseen speed reduction at that point. Signalling has to be relied on to give the necessary instructions to the driver in such a case. Why should implied reliance ever be placed on printed notices? The only justification for giving a driver a printed notice of a speed reduction is so that he may endeavour to gain time to offset the loss caused by the reduction. If the driver fails to see the notice, the worst effect should be unpunctuality. Many comments on availability of printed notices seem to have been made in ignorance of their true purpose.

On page 340 you suggest that a flashing light might be used as a distant indication of a divergence such as that at Bourne End. Why? A reduction from (say) 70 m.p.h. to 20 m.p.h. for the crossover is almost as severe as a reduction to a dead stop and so the appropriate distant indication is the ordinary single yellow.

It should be remembered that in a neighbourhood where the signalling is laid out to cover 80 m.p.h. if necessary, a driver running at anything less than about 60 m.p.h. is justified in regarding double yellow as equivalent to green, as it demands nothing lower than about 50 m.p.h. at the *next* signal. At running speeds of wartime standard, double yellow means the same as green and is therefore *less* restrictive (contrary to L.M.S.R. opinion mentioned on page 359) than is diverging green at a splitting distant.

Yours faithfully,
W. A. TUPLIN

Running, Jointing, and Terminating Cables

Department of Railways,
Sydney, New South Wales. January 24

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I have read with interest the discussion which appeared on page 542 of your issue of November 23, 1945, under the above heading. It may be of interest to your readers to have some information as to the practice obtaining on the New South Wales Railways regarding the method of running, jointing, and terminating signalling cables and wires used in connection with power signalling installations.

Since 1906, when the original power installation was made in Sydney Yard, we have tried out many forms of cables and wires for signalling purposes, and, as the result of experience over the years, we have found in practice that for use at power interlockings separate No. 16 gauge insulated wires, specially manufactured for signalling requirements, with a thickness of dielectric of 5/64 in. wall for outside use, and 3/64 in. wall for internal wiring inside the signal box, are the most satisfactory. Wherever possible, small wiring huts are utilised for housing the wiring to the terminal boards and the local relays and fuses associated with the interlocking. The coils of wire are of 2,000-ft. lengths, and, where practicable, all joints are eliminated, the wires being terminated on a terminal board inside the hut. For housing the runs of signalling wires, we use a Fibrolite trough, which has given universal satisfaction.

One of the advantages in the use of individual wiring is that, in the event of a mishap, there is no difficulty in an electrician dealing with the repairs necessary without assistance and at any time during the day or night.

For surface turnouts for track circuiting purposes, individual wires of 7/20 gauge, with 5/64 in. wall dielectric, are used. This is found more satisfactory than the solid No. 16 gauge wire used for through runs. Wherever possible, however, surface turnouts are avoided, and where signal or overhead catenary structures are available, the troughing is carried over the structures. In other cases, where possible, special troughing bridges are erected. Where main runs of wiring have to be carried under the track, the practice is to use a Parkway cable, terminated on terminal boards on either side of the tracks. As an indication of the results obtained with this form of construction, it may be mentioned that during the twelve months ended December 31, 1945, not one failure due to defective insulation of wiring occurred in the whole of the metropolitan electrified area, where there are 26 power signalling installations, some of which are of considerable magnitude, and where some thousands of miles of insulated wire are in use.

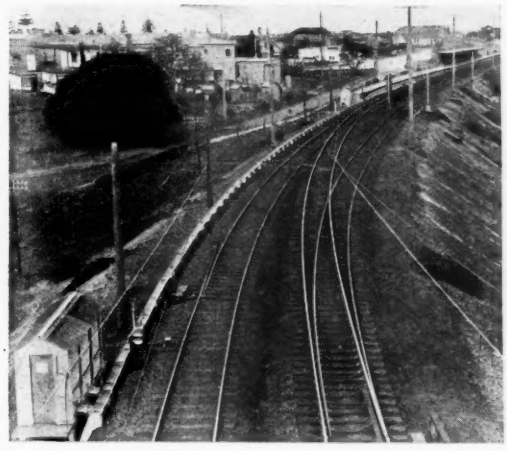
In the past, the practice has been to cover the wiring leading to the terminal boards with asbestos tape, to avoid risk of fire damage, but recently we adopted a new form of flame-retardent outer covering for the rubber insulated wire. This form of covering, which is of the polyvinal-chloride class (P.V.C.), in addition to having the property of being flame retardent, is proof against penetration from oils and moisture, and gives added mechanical protection to the rubber. This special covering dispenses with the use of the outer tape and braid.

Enclosed are three photographs of typical power signalling installations on these railways, one of which shows the relay hut where the wiring is terminated, and the troughing along the railway route. The second photograph shows the internal fittings in a wiring hut, with the wiring encased in asbestos tape; the third photograph shows an electro-mechanical interlocking in the country, with a gantry bridge specially erected to carry the Fibrolite troughing over the running tracks.

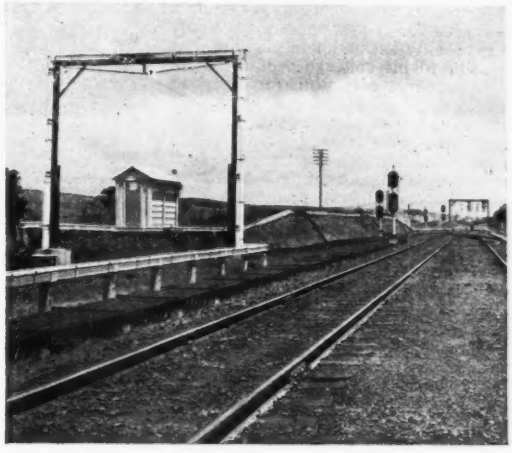
Yours faithfully,

W. F. BARTON,
Signal & Telegraph Engineer

Interior of relay hut, showing wiring encased in asbestos tape



Lineside troughing for signalling cables, with relay hut in left foreground



Cable troughing carried clear of running line on a gantry bridge

"GOLDEN ARROW" LONDON—PARIS SERVICE RESTORATION.—The Southern Railway announces that on and from Monday, April 15, the "Golden Arrow" service will again operate daily between London and Paris *via* Dover and Calais, leaving London 10 a.m. and arriving Paris 6.45 p.m. Reservations can be made at the Continental Enquiry Office, Victoria Station.

The Scrap Heap

Railway Institutes in South Africa have now become Railway Recreation Clubs.

* * *

NON-TALKING CARRIAGES

May I put in a plea to the railway companies for "Silence" compartments? In these leisureless days a journey, even though short, would afford a welcome opportunity for a quiet read were it not for the seemingly inexhaustible conversational powers of one's fellow-travellers. Surely non-talking carriages are more needed than non-smoking ones.—*Eva Ruth Spalding (in a letter to "The Times").*

QUIET, PLEASE

A correspondent to *The Times* urges that railway compartments should be set aside marked "No Talking."

But surely it is a national characteristic (like our wonderful police, and our fogs) that we don't talk in the train. No amount of regulation or regimentation is going to alter that fact; chatter is still mercifully absent from our travel. Unbidden, we can go on keeping the long silence and frowning over our crosswords.—*From "The Evening News."*

* * *

PADDINGTON'S "PETER PAN" RETIRES

The "Peter Pan" of Stationmasters retired on March 30. He is Mr. J. R. C. Williams, of Paddington, whose portrait and biography appear elsewhere in this issue. He has had the distinction of being a stationmaster for 41 years and was not only the senior G.W.R. stationmaster but was also senior to his colleagues of the main London termini. Mr. Williams also had the distinction of being the only G.W.R. stationmaster who wore a silk hat and morning dress.

Royalty and wartime personalities, such as Mr. Churchill, General Eisenhower, Admiral Stark, and Mrs. Roosevelt, have all been met by "The Hat" and only one "V.I.P." has been known to take exception to it. That was Ribbentrop, who, when German Ambassador, requested Mr. Williams not to wear his tophat when meeting him as it drew too much attention to his presence at the station.

Mr. Neville Chamberlain, when Chancellor of the Exchequer, however, found "The Hat" very useful. He arrived at Paddington one day without enough money to pay his taxi fare to the Treasury in Whitehall. A pound note changed hands, and the Chancellor of the Exchequer went off to balance his Budget.

He has been the fairy godfather of thousands of passengers passing through Paddington Station. For instance, there was the elderly lady who asked him to witness her will before she began her journey. Despite Mr. Williams's efforts to assure her that she was being unduly pessimistic she persisted and so the will was witnessed by Mr. Williams and his assistant.

* * *

NEXT WEEK'S RAILWAY CENTENARY

Canterbury to Ramsgate (15¾ miles), South Eastern Railway, opened on April 13, 1846.

* * *

NEW G.W.R. LOCOMOTIVES "GO COUNTY"

Locomotives of the G.W.R. "1000" class are to be named after English and Welsh counties. The first, No. 1000, is named "County of Middlesex." Twenty-nine other locomotives of the class will be named after the following counties:—Bucks, Berks, Wilts, Oxford, Somerset, Devon, Cornwall, Dorset, Brecknock, Cardigan, Carmarthen, Carnarvon, Cheshire, Denbigh, Glamorgan, Merioneth, Monmouth, Gloucester, Hereford, Leicester, Northampton, Hants, Montgomery, Pembroke, Radnor, Salop, Stafford, Warwick, and Worcester.

* * *

100 YEARS AGO

From THE RAILWAY TIMES, *April* 4, 1846

OXFORD, WORCESTER, and WOLVERHAMPTON RAILWAY.—NOTICE is hereby given, That the Directors will receive, at their Office in Foregate-street, Worcester, on or before Tuesday, the 28th inst., at Twelve o'Clock, Tenders for the execution of four several contracts.

The Mickleton contract, including a tunnel; two contracts in the neighbourhood of Worcester (one including a tunnel); and one contract at Dudley.

Drawings and specifications may be seen on and after Monday, the 6th instant, at the Office of the Resident Engineer, at Worcester; where, and at the Offices of the Company, No. 449, West Strand, London, forms of Tender may be obtained

By order,
N. T. SMITH, Secretary.

Oxford, Worcester, and Wolverhampton Railway Office, Worcester, April 3, 1846.

"The railroads' number one post-war project ought to be better spacing of ties"

[Reproduced from the "Railway Age"

THE MISSING MOTIVE

A correspondent writes of an experience in a train which had broken down between stations. Passengers were speculating as to the cause of the delay, and their conversation was well sprinkled with the word "loco." Presently a woman passenger intervened to ask, "and which part of the engine is the loco?"

* * *

On March 28, the L.M.S.R. weed-killing train set out on its annual 4,000-mile tour spraying weed-killing solution over its main-line tracks, sidings and loops. The train will operate over a large area of England, Wales and Scotland, visiting Wick in the north of Scotland, Shoeburyness in the south, Cambridge in the east and Anglesey and Bath in the west. The operation will take four months to complete.

* * *

WITH COMPLIMENTS

A woman passenger today records a fine bloom of London Transport's new courtesy campaign. "With the compliments of London Transport, madam," said the conductor on handing her a ticket. "Is this," she asked, "the new courtesy?" He bowed in the crowded bus. "We are trying," he said, with an ironical look in his eye, "to cater for more passengers."—*From "The Manchester Guardian."*

* * *

THEY COME TO STUDY LONDON'S TRANSPORT

Before the war transport undertakings in foreign countries often sent their engineering and operating officials to London to study the Underground, bus, tram and trolleybus systems. These visits are now being resumed, and within the last few months parties of technicians have been given facilities for inspecting London Transport's workshops, depots, garages, stations and power stations. These parties have included scientists from Delft; engineers from the Stockholm tramway undertaking; engineers from the French railways; a Chilean doctor—interested in the board's vehicle driving test methods—and a party from the Netherlands Railways. The party of South African Railways officials now in Great Britain has visited the London Transport railway overhaul workshops at Acton; the Lots Road and Neasden power stations, and the Traffic Controller's Office at Leicester Square Station.

* * *

TAILPIECE

Oh! For the Joys of Spring

Tourist days will soon be here,
Say the prophet and the seer,
And the railways must be smart
Or they will be in the cart.

They will need to use more paint
To put colour where it 'aint;
Lots of polish must be used
Where former lustre's now diffused.

Tourists ask for more hotels
Homes from Home—not citadels—
Where, till holidays are spent,
They can rest in sweet content.

Tourist days must be more gay,
On Iron-road and broad highway;
So, rails, let me intercede—
A good spring clean is what you need.

W. E. N.

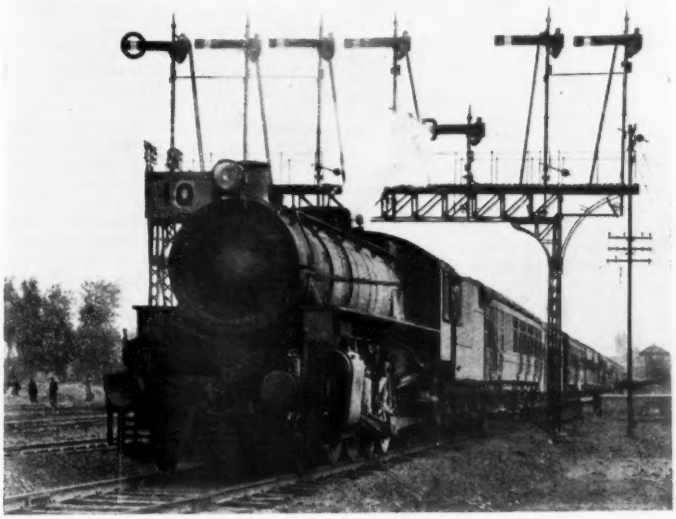
OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

INDIA

Canadian-Built Locomotives on the North Western Railway

Canadian-built "CWD" class 2-8-2 locomotives are now working through between Lahore and Rawalpindi, a distance of 180 miles. From Lahore to Lalamusa, 83 miles, the ruling grade is 1 in 200, though the section is almost level. From Lalamusa to Rawalpindi, 97 miles, the ruling grade is 1 in 100 with long stretches of hard going and many sharp curves. The engines are popular with the drivers who say they have a fine reserve of power and ride easily on the curves. The average speed of the "Sind Express" between Lahore and Lalamusa, exclusive of stops, is 32 miles an hour, and the engines have been given a maximum sanctioned top speed of 45 m.p.h.



Canadian-built 2–8–2 locomotive leaving Lahore for Rawalpindi on No. 19 up "Sind Express," N.W.R.

A general view and dimensioned drawing of one of these locomotives was published in *The Railway Gazette* of July 7, 1944. They have been built by the Canadian Locomotive Co. Ltd., and the Montreal Locomotive Works Limited. The locomotive shown in service in the illustration reproduced herewith is one of those built by the Montreal Locomotive Works.

Collision on East Indian Railway

At 5.55 a.m. on March 4 a head-on collision took place between the "Dehra Dun Express" and a goods train at Bhagauli Station, 48 miles from Lucknow. One report states that both trains were in motion, and the express was travelling at speed. Sixty persons were killed and 84 injured. Two upper class coaches were badly damaged and a third class coach completely smashed. The majority of the killed and injured were third class passengers. The Chief Medical Officer, E.I.R., who was travelling on the express, and the Civil Surgeon of Hardoi, together with medical parties from Bareilly and Moradabad, rendered first aid. Relief trains were sent from Hardoi and Moradabad. The line was completely blocked until the wreckage had been cleared at 2 p.m. on the same day. The drivers of 10 down "Dehra Dun Express" and the goods train were both killed. The injured were taken to the King George's Hospital, Lucknow.

State Railways' Earnings

The total approximate gross railway earnings of the Budget lines for the 10 days ending February 10, 1946, amount to Rs. 568 lakhs. This is Rs. 75 lakhs less than the actual totals for the same period last year, and Rs. 20 lakhs more than for the corresponding period in 1944.

The total approximate gross earnings from April 1, 1945, to February 10, 1946, amount to Rs. 18,837 lakhs. This is Rs. 694 lakhs more than the actual totals for the corresponding period of the previous year, and Rs. 3,535 lakhs more than those for the same period in 1943-44.

KENYA & UGANDA

Demobilisation Traffic

The demobilisation of the East African Army has got well into its stride and troops are being dealt with at the rate of some 20,000 a month. Shipments of 2,000 to 3,000 arrive at a time at the coast and the men are entrained immediately for the main demobilisation depots up-country where they are demobilised and rapidly dispersed either to other centres throughout East and Central Africa or to their homes. All this movement, in addition to a heavy civilian passenger traffic and the seasonal crop movements which always take place in East Africa during the early part of the year, has greatly increased the strain on railway operating facilities, and the closest control has to be maintained over train working.

Portable Telephones for Guards

The issue to guards of all main through trains of portable telephone sets, the wire of which can be connected to the overhead telegraph wires by an easily assembled rod, has resulted in a notable reduction in the time taken to deal with accidents in section by making it possible for news of mishaps to be speedily transmitted to headquarters. In a sparsely populated country like East Africa, with long railway sections, this is an important factor in train working. The portable set is enclosed in a box to protect it from damage, and instructions as to its use, together with a diagram showing how to recognise the station-to-station wire to which the telephone must be connected, are pasted inside the cover. All guards are given instruction in the Training School on the use of the apparatus.

SOUTH AFRICA

Estimated Expenditure on Transport

Railway expenditure from revenue funds for the financial year 1946-47 is estimated at £60,226,000, an increase of £4,130,000 over the expenditure in the current year. (The South African Railways financial year runs from April to March). The estimates, which were tabled in the House of Assembly by the Minister of Transport, Mr. F. C. Sturrock, on February 26, provide for an expenditure on airways of £1,603,000 compared with £288,000 in 1945-46. Of this increase, £1,307,839 is for expansion of air services, including the Springbok service. Aircraft operation accounts for £1,065,696 compared with £144,983 in 1945-46. Estimated expenditure on ground operations has been increased by £192,082 to a total of £247,033.

Increased Railway Wages Bill

The increased expenditure of £4,130,000 on railways is accounted for by salaries and wages for additional staff and for members of the staff who have returned from active service. The estimated expenditure on harbours is £2,703,000, a net increase of £29,000. On steamships there is a decrease in the estimated expenditure of £589,000 for 1946-47, which is accounted for by lower overseas insurance premiums and a smaller number of vessels to be operated. The total estimated expenditure on steamships in 1946-47 is £403,000, compared with £992,000 in the year ended on March 31.

Working Results for Nine Months

The results of working the railways, harbours, steamships, airways, and aerodromes for the month of December, 1945, and the period April to December, 1945, are as follow:—

	December, 1945	April to December, 1945
Revenue ...	£5,542,225	£47,705,625
Expenditure ...	£5,464,052	£49,026,362
Surplus ...	£78,173	—
Deficit... ...	—	£1,320,736

December, 1945, saw record earnings in the second week, and the highest passenger traffics in the first week since the previous record in October, as reported in *The Railway Gazette* of March 8.

Railway Recreation Clubs

The Railway Institutes, now to be called Railway Recreation Clubs, have given the railwayman and his family an advantage which has long been the envy of other Government employees. Berea Park, at Pretoria, with its playing fields, bowling greens, tennis courts, swimming pool, dance floor, and library, is one of the best clubs in the country, and some of the other institutes, especially in the smaller centres, are providing comparable facilities, though on a smaller scale.

Financial Assistance

The railway management has been examining the activities and financial resources of the institutes to see how all

the clubs can be brought into line with centres like Berea Park. The most important decision which emerged from the examination was one which will give the institutes much greater financial assistance. Rental charges have been made easier, the library and capitation grants have been increased, and the management has also agreed to provide free accommodation under certain circumstances as well as more money for playing fields at the smaller railway centres.

It is also intended to give the non-European staff better recreational facilities, and committees are to be appointed at the various centres to see what can be done for them.

CANADA

Cleaning Rolling Stock by Shot-Blast

Well started now on a $300,000 shot-blasting plant at its Angus Shops, Montreal, to clean rolling stock by spraying it with powerful jets of split steel shot, the Canadian Pacific Railway will be the first railway in Canada to go in for shot-blasting on a wide scale. With a floor space of 23,000 sq. ft. the plant, largest and most modern of its kind in the Dominion, will be able to handle two locomotives with tenders and one standard sleeping car in an eight-hour day. Taking the place of the old sand-blasting method, shot-blasting not only does a faster and better job, but also eliminates the danger of silicosis.

The plant will be almost completely automatic, with the used shot and refuse being collected, sorted, and either discarded or diverted for re-use in one continuous process. Before any equipment goes through the plant it will be stripped of all ancillary parts, which will be directed to separate departments for similar treatment in specially constructed blast boxes. In preparation for the process, the engines and cars first go through a room equipped with steam-operated heaters through which air is circulated by fans to provide a quick and thorough means of drying all moisture.

Besides being the first such plant built by a railway company in Canada, it is also the first plant of its kind to be entirely enclosed so that it will be operative in winter as well as summer.

Layout of Plant

The plant will be divided into the following sections: general cleaning shop; drying room; blast chamber; priming room; control room; and equipment room. In the general cleaning shop, locomotives or cars will be shunted over a pit and stripped of various parts which will be blasted with steel grit inside enclosed areas by revolving on tables before suitable blasting nozzles. Adjacent to the drying space will be the blast chamber, measuring 20 ft. x 127 ft. x 20 ft. This is to be a complete sealed-in steelclad area with a 13-ft. deep pit with a steel lining to ensure dryness. In the compartment there will be four portable blast nozzles with trigger controls and four filtered air supply outlets for supplying fresh air to the masks of the operators. Two platforms will be located on each side of the chamber for blasting at different levels.

When a locomotive or car has been blasted, it will be moved into the priming room for a coat of paint to prevent rusting during transfer to the repair shop.

Sequence of Operations

The normal sequence of operations through the plant will be as follows: A locomotive or car brought into the cleaning shop will be placed over the pit, and cleaned of grease and grime with a steam jet. Parts, such as connecting rods and smokebox cover of locomotives, or bogies of cars, will be removed to prepare the unit for blasting. It will then be transferred to the drying room and thoroughly dried before entering the blast chamber. It is most important that it be thoroughly dry, as the blasting process employs steel abrasives which must be kept dry, otherwise they would rust rapidly. The steel abrasive is shot from nozzles at high pressure handled by operators equipped with helmets with hose attachments to fresh air supply at low pressure. Four operators will clean a locomotive or passenger car of old paint in approximately three hours. The used abrasive, together with dirt and scale, drops through the perforated floor to hoppers, and is eventually returned, after cleaning and drying, to the operator's nozzle.

Air-Cleaning

During the blasting process, while the reclaiming mechanism is at work, the dust-laden air in the blast chamber is exhausted at one end and piped to a dust collector above the blast room by a large exhaust fan. Air enters the blast chamber through louvred doors and passes through the room at the rate of 43,000 cu. ft. a minute, and thence to the dust collector, where it is filtered. This air is then returned to the cleaning shop for re-circulation in the winter (to the atmosphere in the summer). In this process the dust and dirt is deposited into suitable hoppers below the filters. When sufficient dust has accumulated in the hoppers, it is discharged by means of a screw conveyor to a gondola car for disposal.

After the exterior of a locomotive is blasted clean and the inside of the firebox is to be blasted, a vent hood is lowered and placed in front of the smokebox. This vent hood is connected to the dust collector, so that the dust-laden air is drawn through the locomotive tubes and away from the firebox.

UNITED STATES

B. & O. Radio Experiments

Mr. L. J. Prendergast, Communications Superintendent of the Baltimore & Ohio, recently gave an account of the radio experiments carried out by his system, and of the conclusions drawn from them. He said the railway was convinced of the advantages to be gained from the provision of radio link between control offices and shunting locomotives in large marshalling yards and terminal station areas, but still reserved its judgment on the benefits of driver-to-guard and lineside-to-train communication.

The company's radio equipment operates on wavelengths in the neighbourhood of 2 metres. The aerials need not therefore be more than 15 to 20 in. long, and can be mounted vertically on the locomotive tender without loading-gauge difficulties arising. All transmitting and receiving equipment is adjusted for operation on two pre-selected wavelengths in the allotted band. Mr. Prendergast added that his company has ordered ten "walkie-talkie" sets which will be used experimentally by permanent way and outdoor signalling staff.

Standard Power Supply Recommended

A committee appointed by the Association of American Railroads has recommended the adoption of a 117-volt 60-cycle a.c. supply for all radio installations, whether fixed or on locomotives or rolling stock. On locomotives this can be supplied conveniently from a turbo-generator, and might be taken from an additional winding on the generator that supplies the standard 32 V. d.c. supply. There is some divergence of opinion regarding the best source of power for guard's van installations, some advocating a motor-alternator driven from storage batteries, and others a small diesel-electric or petrol-electric set in the van.

The 117-volt a.c. supply is, of course, only the input to the radio equipment, which incorporates its own transformers and rectifiers for providing the considerably higher voltages required at the valve anodes, and also for stepping the input down to a suitable level for the cathode heaters.

FRANCE

Progress in Railway Reconstruction

Great progress was made by the French National Railways Company (S.N.C.F.) in its reconstruction work during 1945, as shown by figures recently issued. Transport conditions in France, paralysed by the destructive effects of the war, called for an immense effort of restoration. The total number of bridges destroyed was 2,600. By January, 1945, 1,244 bridges had been repaired, and during the year the total was brought up to 2,300. Many of the repairs were provisional, necessitating reduced speed. In addition, 2,230 miles of line had been relaid and 8,500 signal boxes and items of permanent way apparatus replaced or repaired by January, 1946. The task was accomplished in the face of difficulties in obtaining raw materials. Wrecked locomotives, wagons and carriages were rebuilt by utilising spare parts obtained from other wrecked engines and cars.

Increases in Rolling Stock

The rolling stock available in January, 1946, compared with January, 1945, and with 1939, is shown by the following figures:—

	1939	Jan., 1945	Jan., 1946
Locomotives ...	17,000	5,800	8,650*
Wagons	460,000	153,000	270,000
Carriages	36,000	10,000	12,360†

* Including 130 imported from the United States and 1,020 recovered in Germany
† Including 1,860 recovered in Germany

As reconstruction progressed, the average daily runs of locomotives advanced in 1945 from 33 miles in April to 44 in July, and to 100 miles in December. Also, the number of passengers carried in the holiday period of 1945 rose tremendously, reaching a total of 26,000,000 passengers in July. Goods traffic, too, rapidly increased. The monthly mileage of passenger and goods trains continued to advance in 1945, as follows:—

	Passenger (Miles)	Goods (Miles)
January	800,000	2,190,000
May	3,220,000	5,084,000
July	4,220,000	5,580,000
December	4,650,000	7,316,000

The total number of wagons loaded rose in 1945 from 84,300 in January to 201,700 during the first week of December.

Order for 36,000 Wagons

The French buying mission in America recently ordered 36,000 freight wagons, delivery to be made as far as possible before the end of the year. A separate order for 600 wagons was placed for the Moroccan, Algerian and Tunisian railways. The vehicles comprise about 24,000 vans and 12,000 open wagons, all specially adapted for French railway service. The vans will be 24-ton 4-wheel vehicles. The total cost of the 36,000 wagons is put at $100 million. The order includes 12,000 tons of spare parts. Negotiations for the purchase of passenger coaches are in progress.

Earthworks and Bridges on the Chessington Line

Some constructional details of the last pre-war addition to the electrified suburban system of the Southern Railway

THE construction, and present satisfactory state, of the works on the branch from Motspur Park to Chessington, the last pre-war addition to the electrified London suburban system of the Southern Railway, were described, with the aid of an excellent series of lantern slides, at the meeting of the London Section of the Permanent Way Institution, held at Clapham Junction on March 18, by Mr. D. G. Williams, B.Sc., A.M.Inst.C.E., Chief Civil Engineer's Department, Southern Railway.

The branch leaves the Wimbledon and Epsom line south of Motspur Park Station, and at present extends to Chessington South, a distance of 4 miles, with intermediate stations at Malden Manor, Tolworth, and Chessington North. The layout allows for a future extension to meet the Epsom line again just north of Leatherhead, and form a loop line about 7½ miles long.

Construction work was begun early in 1936, and the railway was opened from Motspur Park to Tolworth on May 28, 1938, and extended to Chessington twelve months later. When the first section was completed, the works were fully described and illustrated in our issue of May 27, 1938.

The predominance of embankment over cutting is a distinct feature of the works, and one that might suggest that a more even balance between cut and fill might have been obtained. The levels were, in fact, governed by the headroom required at the bridges. Moreover, the clay excavated from the cuttings was not entirely suitable for forming embankments, as exposure to the weather would result in slips. It was, however, decided that a core of clay could be formed in the banks without causing trouble, provided it was well covered with good dry imported material. The required cross section of normal width embankments had the formation level 2 ft. below rail level on the centre line of the railway, and a fall at 1 in 45 outwards on each side, to drain over the tops of the side slopes. The width between the tops of the slopes was 31 ft. 6 in. This was 1 ft. 6 in. wider than banks hitherto constructed, and has been made the standard for embankments on the Southern Railway electrified lines.

Troubles from Settlement

When railways are opened soon after the banks have been tipped, troubles are likely to be experienced, as settlement occurs. In the first place, the top sinks, and has to be made up with ash or granite ballast, and the width of the formation is then less than when it was first tipped. Secondly, if the bank is tipped higher than the true level, to allow for settlement, a further trouble is experienced, owing to the fact that the top sinks unevenly. As soon as low spots develop in the track, they are packed up by the permanent-way staff to maintain good running, so that the tracks never assume their true grades.

On the Chessington line a method of allowing for settlement was tried, which might obviate these difficulties. The banks were tipped only to the height shown on the working drawings, but extra wide cesses were secured by making the sides of the banks slightly steeper than the agreed slope of 1½ to 1. To this end, the width at formation level was increased by one-eighth of the height of the bank. This value was a trial one, based on the settlement of the banks already constructed, but the results have proved most satisfactory.

The sides of the clay core in the embankments were sloped at 1½ to 1, and were kept 6 ft. inside the slopes of the finished dry filling (measured perpendicularly to the slopes). The depth of dry filling above the top of the core was never less than 8 ft., and was sometimes more, as the maximum depth of clay was limited to 8 ft. on the first section of the railway, and to 12 ft. on the second section, where the limit was raised to accommodate more clay, and reduce the excess of excavation. In most cases, drainage was provided by a ditch, about 12 ft. from the toe of the embankment, discharging into sewers or streams at convenient points.

Transport of Dry Filling

The imported dry filling was obtained under an arrangement with a London contractor, who arranged that his clients should bring the material arising from their demolition work to two London goods depots in tip lorries, which could empty their loads from a special staging direct into railway wagons. Excellent material, containing a large proportion of hardcore, was thus obtained for the mere cost of haulage. It was, however, essential that the scheme should not be marred at any time by the inability of the railway company to receive material, as the supplying contractor would immediately lose his clients, who would have to tip their material elsewhere, and might not be persuaded to return later. To avoid such interruption, the clay core for the embankments had always to be finished, and rail communication established to it, before the dry filling was completed on the previous bank. The embankment slopes were covered with 4 in. of soil, and sown with rye grass and Dutch clover seed.

To avoid serious trouble from slips, the cuttings were sloped at 2½ to 1, and a very elaborate and costly system of slope drainage was adopted, which has proved entirely satisfactory. Buttress or batter drains were constructed wherever the vertical height of the cutting exceeded 12 ft. From top to bottom of the slopes, brick-filled trenches were provided, 3 ft. 6 in. wide at the top, and increasing in width towards the bottom at the rate of 1 in 10. The bottom of each trench rose in steps measuring 8 ft. 6 in. horizontally, and rising 3 ft. 6 in. The steps were covered with Portland cement concrete, 6 in. thick at the front edge, and 1 ft. 3 in. thick at the back, the bottom surface having a fall inwards to prevent sliding, and the top a fall outwards for drainage. These batter drains were formed at 20-ft. centres in the cuttings east of Tolworth, and at 33-ft. centres in the Chessington cutting. From a point midway between the top of each two drains, secondary drains ran downwards to meet the main drains at 45°. These smaller drains were 2 ft. 6 in. wide and 2 ft. deep, and were floored with Portland cement concrete 9 in. thick at the sides, and dished to 6 in. at the centre.

Bricks, picked out of the hardcore, were packed against the sides of all the trenches, and backs of the steps, to form walls without mortar, and the intervening space was filled with brick rubble. Over the top of the rubble, bricks were pitched on edge in neat courses, with the upper face 4 in. above the trimmed slope, to allow for soiling. Rows of sods, cut from good turf, were laid over the tops of the secondary drains, and along the bottoms of the slopes, to retain the soil, which was spread to a depth of 4 in.

At the bottom of each buttress drain, the rubble was retained by a concrete wall, built up to the level of the underside of the sleepers, and through this wall, at the level of the lowest step, passed a 6-in. earthenware pipe, which connected with a drain running along the cess. The drains in the cesses were laid with open joints on at least 6 in. of Ciment Fondu concrete, which was carried halfway up the sides of the pipes, and they were covered with brick rubble to drain the permanent way. Ciment Fondu was used, not for its rapid hardening properties, but for its resistance to sulphates, which were present as large crystals in the clay. These sulphates cause rapid disintegration of Portland cement concrete when they dissolve.

The standard formation for cuttings on the Southern Railway is 28 ft. wide between the bottom of the slopes, and provides for a layer of ashes up to 1 ft. 3 in. below rail level. On the Chessington line, the first three cuttings were formed in this way, except that, as a precaution against the clay rising under the track, the formation was excavated 6 in. lower throughout to allow for an extra thickness of ashes.

In the big cutting at Chessington, the clay was particularly bad, and it was decided to use rolled hardcore over the ashes as an additional blanket. The formation was therefore carried down to 3 ft. below rail level, and covered with 15 in. of ashes before the hardcore was laid and rolled with an 8-ton steam roller to a flat surface, 1 ft. 4 in. below rail level. The track was then laid and ballasted at once with Meldon granite.

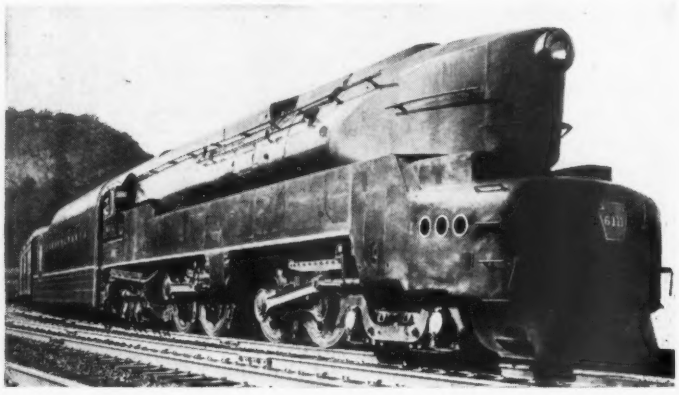
With one exception, the bridges consist of mass concrete walls supporting steel girders, entirely encased in concrete, and concrete decking.

Details of Construction

A typical example of the methods employed is provided by the bridge at Manor Drive, where the square span between the abutments was 50 ft. The abutments were built on foundations 12 ft. 6 in. wide, and carried down to 7 ft. below road level. The concrete, composed of 1 volume of Portland cement to 6 of Thames ballast, was cast in layers 2 ft. deep. Brick hardcore was packed on the steps at the back of the walls, and the water thus collected flowed through open-jointed drains, or over a sloping surface of clay puddle to weep pipes in the walls. Main girders, each weighing 20 tons, were laid on grillage bearings, made up of 3 layers of old rail, built into the walls. After the cross-girders had been riveted into position, shuttering was erected, and the whole structure was encased in concrete. In the design of the bridge, the concrete was not regarded as adding to the strength of the structure, but only as a protective covering to the girders. In addition to eliminating all necessity for painting, the concrete reduces vibration, and secures a low ratio of live load to dead load. On the other hand, if the ground is soft under the walls, the high dead load necessitates wide, and possibly piled, foundations. In the case of Manor Drive bridge, the weight of the steel in the span is 90 tons, and of the surrounding concrete 390 tons.

High-Speed Locomotives for the Pennsylvania Railroad

Four cylinders drive two independent sets of four-coupled wheels 100 *m.p.h. with* 1,000 *ton load*



IN *The Railway Gazette* of April 28, 1939, and again in our issue of September 27, 1940, we were able through the courtesy of Mr. F. W. Hankins, Vice-President and Chief of Motive Power, Pennsylvania Railroad, to illustrate and describe a large locomotive of an entirely new type built at Altoona, Pennsylvania, for the high-speed operation of heavy passenger trains. This locomotive was marked by having four outside cylinders; each pair drove independently two sets of four-coupled wheels, and incorporated the use of six-wheel leading and trailing bogies. This large engine attracted considerable attention at the New York World's Fair, and has been handling heavy passenger trains. (See *The Railway Gazette* for September 3, 1943).

The locomotives forming the subject of the present article are a further development of the original design; they were built by the Baldwin Locomotive Works, Philadelphia, Pennsylvania, to plans made in conjunction with the Pennsylvania Railroad motive power authorities. Operating requirements were determined by the following considerations.

Main-line passenger services between the Pennsylvania Terminal, New York, and points west are now operated by electric locomotives as far as Harrisburg, which marks the termination of the electrified zone. Here the traffic is handed over to steam power, and it was stipulated that the new engines should equal the electric locomotives in capacity, and be able to work through from Harrisburg to Chicago, a run of 713 miles with one stop for coal at Millbrook, Ohio, about 400 miles from Harrisburg. The electric locomotives have a continuous rating of 4,620 h.p. They weigh 205 tons, and receive a.c. current by means of pantagraphs at 11,000 volts, 25 cycles, from an overhead line. The maximum tractive effort is 65,000 lb.

The steam locomotives were:—

1. To be capable of maintaining a speed of 100 m.p.h. with a train of 880 short tons on a level tangent track.
2. To have a maximum weight per pair of driving wheels of 67,500 lb.
3. To negotiate curves up to 15°.
4. To negotiate grades of 3 per cent.
5. To have a wheel base inclusive of the tender such as to permit the use of a 110 ft. turntable.

To meet these conditions the 4-4-4-4 wheel plan has been adopted with four 19¾ in. by 26 in. cylinders in pairs, each of which drives four-coupled wheels of 80 in. dia. Pennsylvania standards have been followed as far as possible in working out the design; thus the boiler is of the standard type with modified Belpaire firebox, as used by the railway; the working steam pressure is 300 lb. per sq. in. The rated tractive effort is 65,000 lb., but for one of the two locomotives so far built this is increased to 78,500 lb. by a Franklin booster applied to the trailing truck.

The Boiler

The boiler is of nickel steel, and has a maximum diameter of 100 in. next to the firebox. There are 184 2¼ in. tubes, and 69 5½ in. flues for the type A superheater; the superheater elements are of the sine wave pattern. The tube length over the tubes plates is 18 ft. The firebox has a combustion chamber extending 84 in. into the barrel; it is fitted with five circulators which carry the arch. The grate area is 92 sq. ft., and firing is by means of a standard type H.T. mechanical stoker.

Feed water is supplied by a Hancock turbo-feed heater, and by a Sellers injector; both have a capacity of 13,000 U.S. gal. an hr. The superheater header incorporates a multiple valve regulator; the diameter of the internal steam pipe leading from the dome to the superheater is 10½ in. The smokebox steam pipes are of 9½ in. dia.; they join a tee in each of the outside steam pipes of 7 in. dia. which run longitudinally under the boiler on each side to connect with manifolds at the cylinders. The exhaust from the rear pair of cylinders is through a pipe on the centre line of the engine leading into the front saddle, and from thence to the rear blast pipe; the front cylinder exhaust passes through passages in the saddle to the front blast pipe. Steam for the feed heater is taken from the rear cylinder exhaust system. The double chimney has 19 in. dia. openings, and the front end arrangement follows Pennsylvania standards; it is similar to that used for the 6-4-4-6 locomotive. The smokebox is fixed to a saddle cast integral with the frames and there is a sliding boiler support at the rear cylinders; also the four corners of the firebox are made to rest on sliding shoes.

The main framing is made up of a single nickel-steel casting which includes the smokebox saddle, the cylinders complete with rear covers, the poppet-valve housings, and the several brackets for the air-brake compressors and other attachments; it is an outstanding example of the founder's art. An outstanding feature of the design is the use of poppet valves with a special driving motion. The gear was developed by the Franklin Railway Supply Co. Inc.; it was described in our October 10, 1941, issue, in an article dealing with the fitting of this gear to one of the Pennsylvania "K.4s" Pacifics No. 5399. The considerable increase in power output obtained with this engine and the generally satisfactory performance in service prompted the application of the poppet valve in the new engines.

There are two steam inlet and two exhaust double-seated valves disposed in the horizontal plane at each end of each cylinder. These valves are operated by oscillating cams on shafts fitted one above the other in a cam box placed on the cylinder between the valve housings. The valve diameters are 5 in. and 6 in. for the admission and exhaust respectively. Each cam shaft is separately operated by a connection with a gear box containing four sets of valve gear, two for the inlet and two for the exhaust valves on each side of the engine. The primary motion operating these valve gears is obtained by a connection with the crossheads through union links, as in Walschaerts motion.

The arrangement is such that alteration of cut off can be achieved while at the same time maintaining a late release and compression. The gear as described is duplicated in an engine with four cylinders; for the engines under notice there are two gear boxes, one placed ahead of the front cylinders and on the main frames at the centre of the engines, and one placed on the centre line between the frames for the rear cylinders.

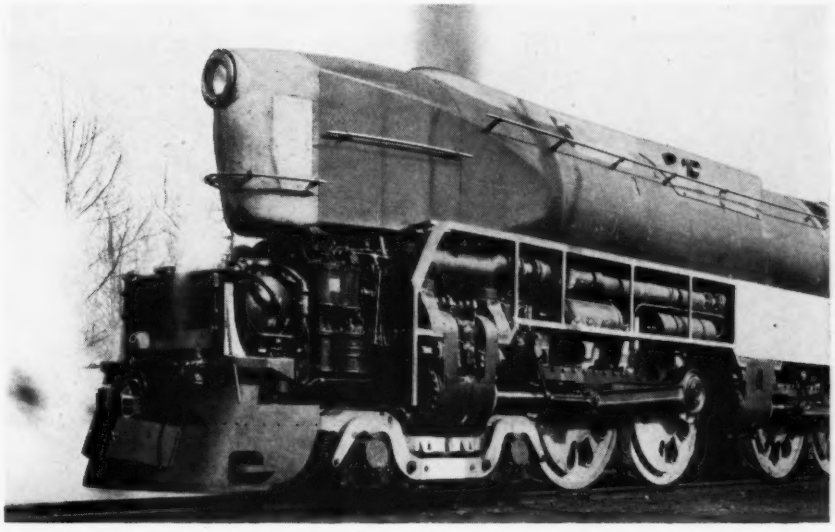
The gears are controlled by an air motor in the cab through suitably arranged rotating shafting, with universal and slip joints as necessary. The working parts are entirely enclosed; the cam shafts bearings receive oil from a pump in the cam chambers, and the valve gears have oil bath lubrication. Valve-gear components run on needle roller bearings.

The entire locomotive is carried on Timken roller-bearing axle boxes; Timken bearings are also used for the coupling-rod and main-rod bearings, likewise for the crosshead bearings. The pistons with hollow rods, the crossheads which are of the multi-ledge type, and also the main rods were supplied by the Timken Roller Bearing Company; they are of special high-tensile heat-treated steel. The reciprocating weights, of which 52 per cent. are balanced, are 1,041 lb. for the front unit, and 951 lb. for the rear on each side of the engine. Baldwin disc centres are used for the coupled wheels. The coupled wheel-base is 25 ft. 4 in. and to obtain flexibility the leading pair of each group is allowed a total of 2 in. lateral displacement, for which purpose an Alco control is fitted. The front and rear trucks have cast-steel frames; the heat-treated rolled-steel wheels are of 36 in. dia. for the former, and 42 in. dia. for the latter. Mechanical lubricators are fitted for the cylinder and poppet valve spindles.

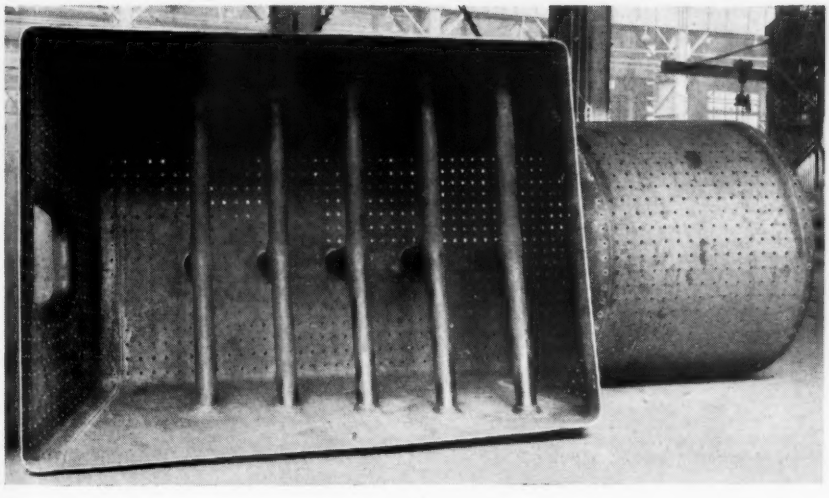
Special consideration was given to the

(*Continued on page* 386)

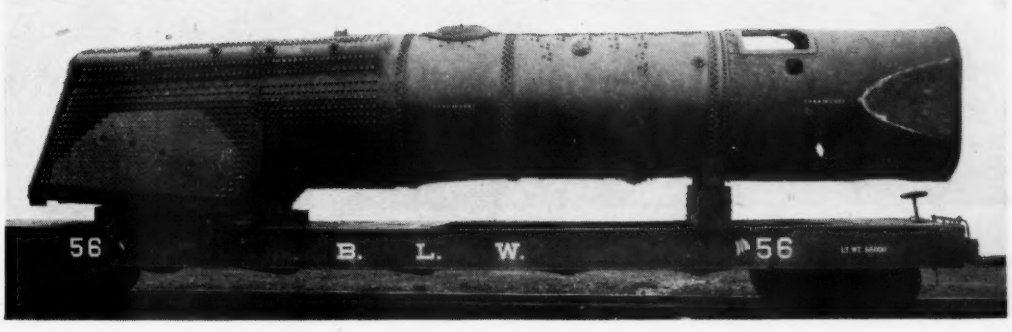
High-Speed Locomotives for the Pennsylvania Railroad



A view of the locomotive with part of the sheathing removed while undergoing tests showing arrangement of cylinders, steam pipes, air compressors and air reservoir

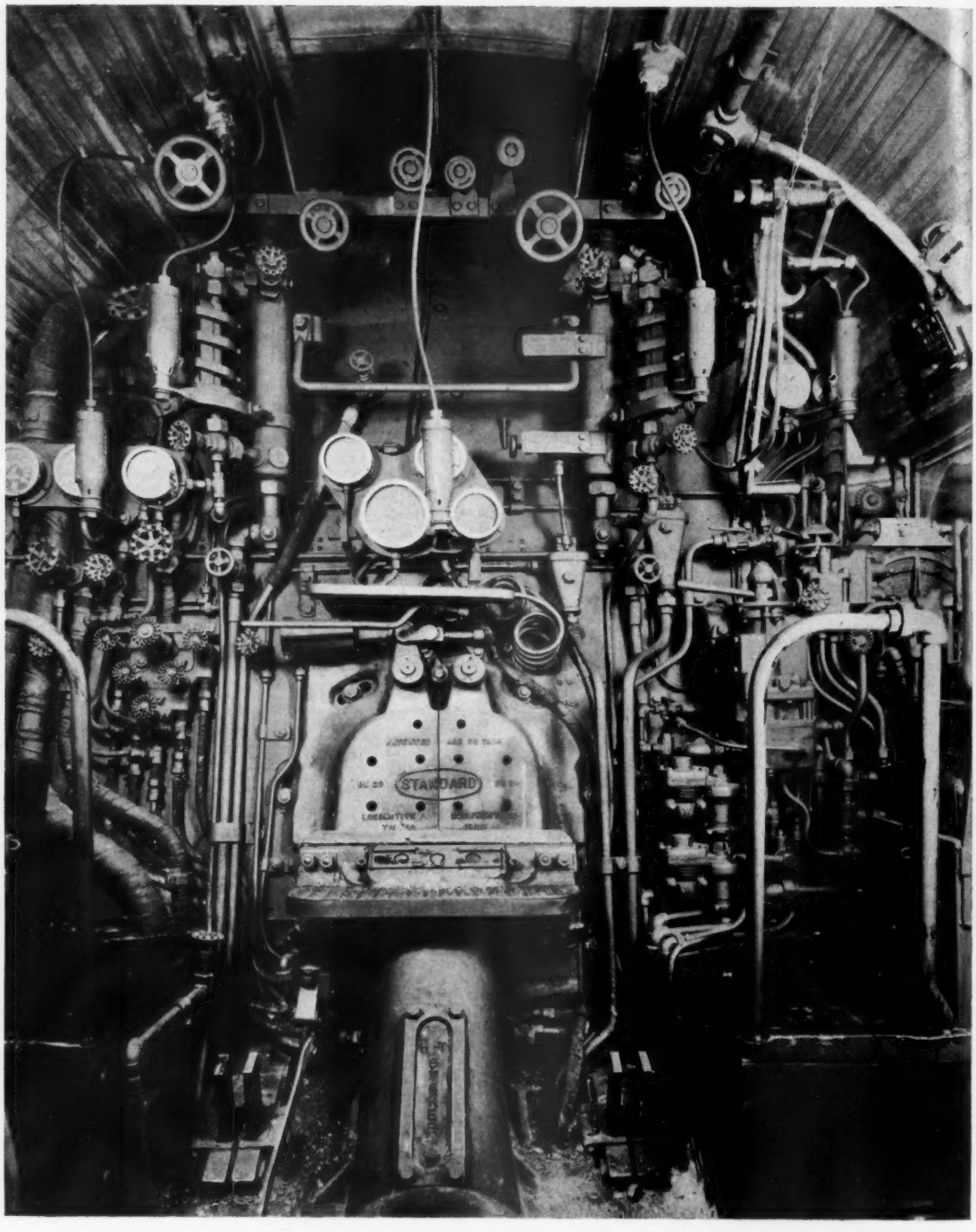


View inside firebox, showing water circulators which also support the brick arch



The boiler has a modified Belpaire type firebox

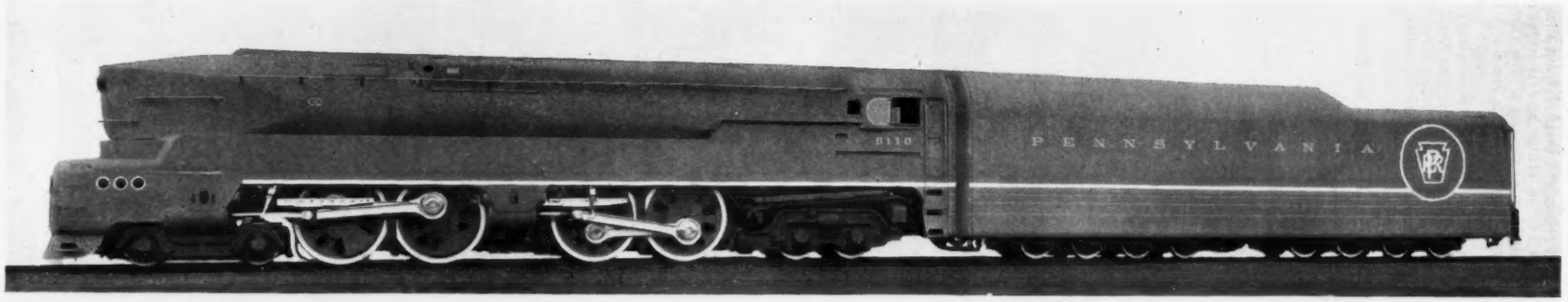
High-Speed Locomotives for the Pennsylvania Railroad



General view of the cab showing the convenient arrangement of the controls

High-Speed Locomotives for the Pennsylvania Railroad

High-Speed Locomotives for the Pennsylvania Railroad



General view of the new 4-4-4-4 high-speed locomotive, Pennsylvania Railroad

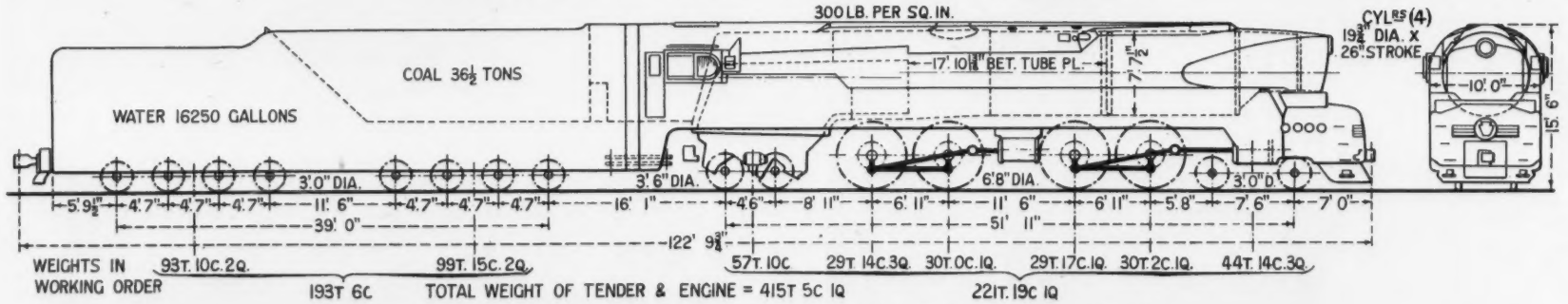
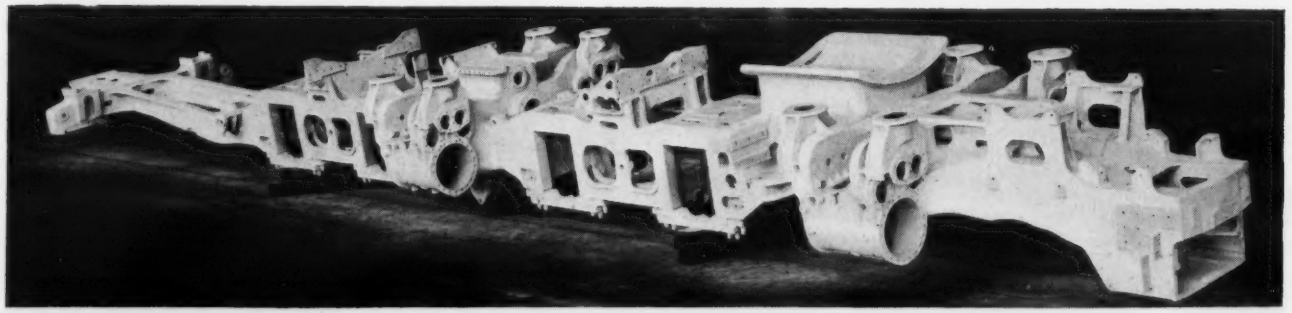


Diagram showing principal dimensions and weights of the locomotive and tender



The bed, for both front and rear engines, is a single casting

Restoration of the Victoria Bridge, Montreal, C.N.R.

The stone abutments and piers of this 1¼-mile structure are being strengthened by pressure grouting and by refacing with Prepakt concrete on a large scale

THE great Victoria Bridge over the St. Lawrence, in the course of its 91-years' existence, has suffered severely from weathering and ice-abrasion. When the winter ice breaks up, the swift and deep current carries great ice loads, which sometimes overtop the piers, and also heavy bed loads of boulders. The piers and abutments carry a double-line section of the Canadian National Railway between the trusses of the through lattice girders, and also a two-lane roadway cantilevered out on one side, and a single track of the Montreal South Shore electric railway on the other; the superstructure is 66 ft. 8 in. in width. Founded on solid rock, the masonry consists of a coursed ashlar shell of 5-ton to 20-ton limestone blocks in lime mortar, and a hearting of rubble also in lime mortar.

The Victoria Bridge, looking towards Montreal from the opposite side of the river

Extent of Damage

Observations showed that the lime mortar in the joints had weathered and that the blocks had become loose and the vertical joints had opened out. The damage was made worse by water percolating into the structure and freezing, the expansion thus resulting forcing the joints to open out wider.

Many of the blocks also contained shale, which, as well as being weak, absorbed moisture and expanded and disintegrated in frost. So serious was the disintegration that many stones had disappeared. Moreover, the piers were subjected to severe racking due to the expansion and contraction of the steel truss spans, in some cases to the extent of splitting the masonry, and many of the stone blocks were deeply scored by the ice.

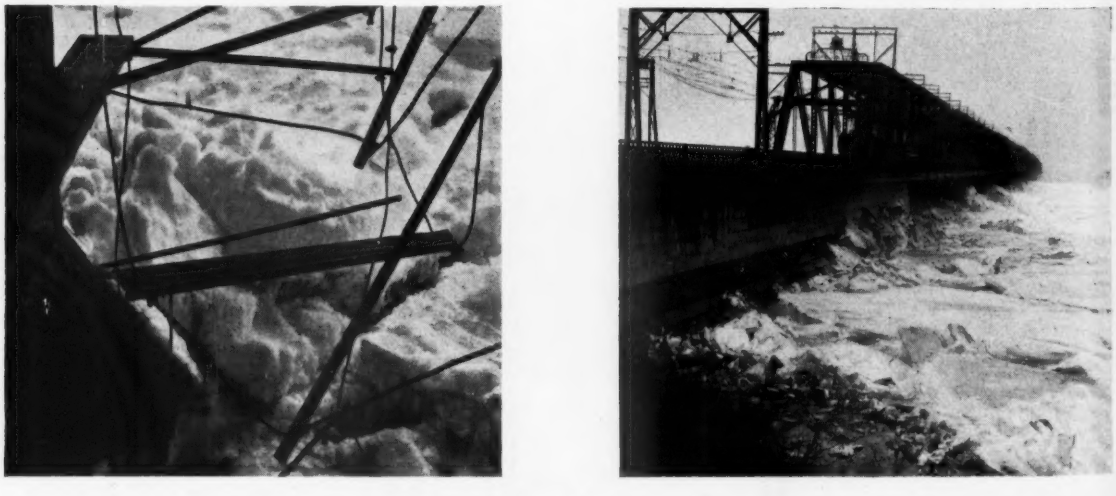
Several remedies were considered as alternatives to complete rebuilding, and in 1941 it was decided to consolidate the masonry by pressure grouting with cement and sand, and to replace the worn and disintegrated stones by the Prepakt concrete method. A special grout which could be forced into small spaces without bleeding or plugging, and which would set without shrinking, was pumped into holes drilled throughout the masonry, all apertures thus being completely filled with the solidified mixture, and the whole consolidated.

The Prepakt method of replacing the surface blocks consisted of packing the spaces with coarse aggregate and then solidifying the mass by forcing cement and sand into its interstices, the pressure ensuring complete filling of the space and tight bonding with the surrounding masonry.

Work began in 1942 from the Montreal end of the bridge and is expected to be completed by the end of this year. Several piers—of which there are 24—were taken in hand at a time. Special scaffolding, consisting of ¼-in. wire slings carrying tubular sills, planking, and handrails, was hung completely round each pier. The grout mixing and pumping plant was also slung under the bridge at each pier.

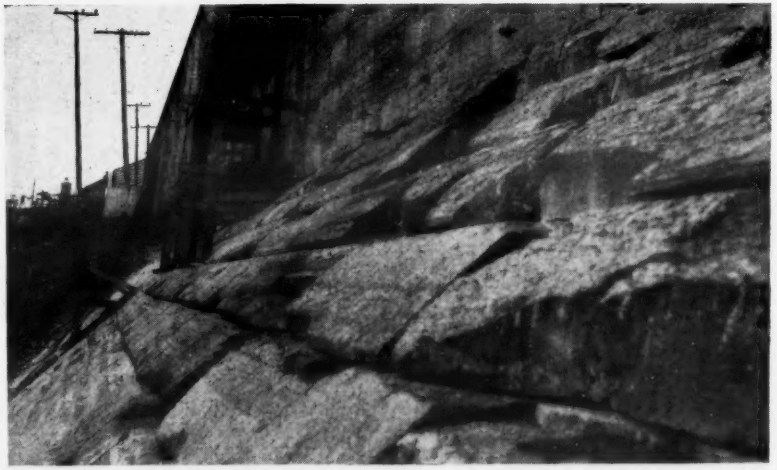
Details of the Work

The joints were first raked out and re-pointed, and the grouting holes were then drilled at sufficiently close intervals to ensure that all joints, cracks, and voids would be filled without excessive pressure, which might dislodge the blocks. Near the foundations, holes were drilled diagonally through the pier and several feet into the rock below; the diameter of all holes was such as to permit of 1¼-in. grout pipes being inserted to their full depth. To prevent the filling up of the lower parts of each pier with water, and to ensure that all voids were completly filled, the sequence of grouting at the various holes and to various depths in any given hole was carefully controlled. The extent of the voids to be filled is shown by the fact that, on an average, the volume of grout required was found to be about 12 per cent. of the volume of the pier. In one pier alone 9,000 sacks of cement had to be used. Pressure tests after grouting have proved the complete solidification of the structure, and under-water grouting was inspected by divers.



Ice conditions to which the piers and abutments are subjected during the winter. Left: Scaffolding slung round pier above heavy block ice. Right: General view of bridge in winter

Restoration of the Victoria Bridge, Montreal, C.N.R.



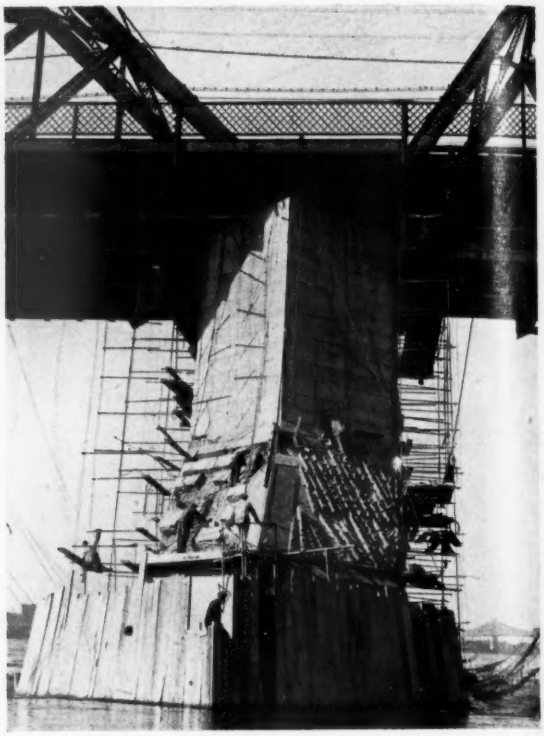
Upstream face of one of the abutments before the repair work was undertaken

The same abutment as that shown on the left after the repairs had been completed

Supporting arches of hollow south abutment were found to have sagged as much as 12 in.

One of the arch rings in the south abutment after the repairs had been carried out

Downstream end of a typical pier, showing how erosion, disintegration, and cracking had occurred



Repair work in progress on one of the piers. Note safety nets in right-hand corner and timber shield for protecting diver in foreground

In the restoration of the facing blocks, the unsound stone is first chipped away down to solid material, and grid reinforcement is then fixed in the cavity. Shuttering is fastened over the gap prior to packing with coarse crushed stone and grouting. Some 15 per cent. of the facing stones are being renewed in this manner, and in one pier as many as 230 blocks had to be restored.

Strengthening the Abutments

The abutments are of the same general construction as the piers and extend from the river bank several hundred feet at each end of the bridge. They are being dealt with by similar methods, but, in addition, further defects were found in the south abutment, which is hollow. It includes a series of nine circular barrel arches, each of 27-ft. span, closed on the downstream side by a 6-ft. to 8- ft.-thick vertical wall, and on the upstream side by a series of longitudinal side arches supporting the sloping upstream face. Here the disintegration had caused the arches to sag, in some cases to the extent of 12 in., and many of the stone blocks were broken. Each of the arches was strengthened by building a reinforced Prepakt-concrete arch beneath it to support the stonework. Subsequent grouting penetrated the joints and crevices of the masonry and formed a monolithic block of the whole. The new concrete arches rest on r.c. beams along the springing, supported in each instance by four concrete pilasters; Prepakt concrete is being used thoughout. Each upstream side arch was also supported by Prepakt concrete, which, in turn, was supported at its upstream edge by an r.c. wall.

It is estimated that this abnormally extensive grouting job will cost less than 10 per cent. of the cost of renewing the piers and abutments, and it has proved entirely successful in providing a sound and solid structure. The work is being carried out by Intrusion-Prepakt Limited, of Toronto, under the direction of Mr. C. P. Disney, Engineer for Bridges, C.N.R. A signed article by Mr. Disney in our American contemporary, *Railway Age*, is the basis of the above description of the work, and the illustrations used in this issue also emanate from the same source and from Mr. Disney.

High-Speed Locomotives for the Pennsylvania Railroad

(*Concluded from page* 380)

brake gear, as in order to avoid excessive block pressures a clasp-brake gear was thought essential. For the leading and trailing trucks this arrangement was readily applied, but for the coupled wheels, due to the short distance of 6 ft. 11 in. between centres, and to the lateral play allowed in the leading pairs, application was more difficult. Provision had to be made for the lateral translation of the brake blocks in unison with the wheels to maintain correct contact with the tyres in all lateral positions. The blocks on the trailing truck wheels and also on the coupled wheels are located on each side of the wheel above and below the centre; those above are the leading blocks. High-tensile steel is used for the brake rigging which is designed for an emergency pressure of 95 lb. per sq. in. The spring gear follows conventional standards, and is continuously compensated from the leading drivers to the rear truck. The engine weight is 497,200 lb., equal to 222 tons, of which 119.80 are available for adhesion. The average weight per coupled axle is 67,100 lb. or about 30 tons.

As already stated, the new locomotives were required to make the run of 713 miles from Harrisburg, Pennsylvania, to Chicago, Illinois, with one stop only for coal; consequently it was estimated that fuel space for 41 short tons would be necessary. Due to the presence of track-troughs tank capacity for 19,500 U.S. gal. of water was considered sufficient. Fully loaded these tenders weigh 433,000 lb. or 193.3 tons. They have cast steel underframes, and are carried on two eight-wheeled trucks.

Principal particulars are given in the following table:—

Cylinders (4), dia.	19½ in.
,, stroke	26 in.
Coupled wheels, dia.	6 ft. 8 in.
Evaporative heating surface—	
Tubes and flues	3,719 sq. ft.
Firebox and circulators	499 sq. ft.
Total	4,218 sq. ft.
Superheating surface	1,680 sq. ft.
Combined total	5,898 sq. ft.
Firegrate area	92 sq. ft.
Boiler pressure, per sq. in.	300 lb.
Tractive effort (at 85 per cent. boiler pressure)	65,000 lb.
Adhesion weight	119¼ tons
Weight of engine in working order	222 tons
Water capacity of tender	16,250 gal. (Imp.)
Coal ,, ,,	36½ tons (U.K.)
Weight of tender, full	193½ tons
Total weight of engine and tender	415½ tons

We are indebted to Mr. H. W. Jones, Chief of Motive Power, Pennsylvania Railroad, for assistance in the preparation of this article.

RAILWAY NEWS SECTION

PERSONAL

G.W.R. CHIEF GOODS MANAGER

Mr. David Blee, Principal Assistant to Chief Goods Manager, has been appointed Chief Goods Manager, Great Western Railway.

Mr. H. H. Dyer, M.I.E.E., M.I.R.S.E., who, as recorded in our March 22 issue, has been elected President of the Institution of Railway Signal Engineers, is Assistant Signal & Telegraph Engineer of the L.M.S.R. He is the elder son of an Old Reptonian, the late Mr. A. H. Dyer, of Derby, and was himself educated at Derby School and Christ's College, Finchley. He received his technical education at Derby, Nottingham and Birmingham. He joined the Telegraphic Department of the Midland Railway at Derby as an engineering apprentice in 1907, and after a period of training was appointed Technical Assistant. Mr. Dyer had over 20 years' outdoor experience, mainly in connection with electrical signalling and communications, on both new works and maintenance. During that time, he acted as Resident Engineer in charge of the resignalling of the electrified lines between Bow Road and Barking. On the formation of an independent Signal & Telegraph Engineer's Department of the L.M.S.R., under Mr. A. F. Bound, in 1929, Mr. Dyer was appointed Assistant (Signals) at headquarters, Derby. He was made Development Assistant in 1931. In those positions he gained a wide experience of mechanical signalling, and on appointment as Electrical Assistant in 1935 he was made responsible for both mechanical and electrical design. He was appointed Assistant Signal & Telegraph Engineer in October, 1944. Mr. Dyer has served on several committees of the British Standards Institution. He has been a Vice-President of the Institution of Railway Signal Engineers since 1944. He has contributed papers to the Institutions of Electrical Engineers and of Railway Signal Engineers.

Mr. R. E. Sinfield, A.M.Inst.T., Acting General Assistant to the Docks & Marine Manager, Southampton Docks, Southern Railway, who, as recorded in our March 15 issue, has been appointed Divisional Marine Manager, Dover, from May 1, joined the South Eastern & Chatham Railway in May, 1922, as a clerk in the Continental Department of the General Manager's Office. In 1925 he was appointed to assist the Timetable & Publicity Assistant of the Continental Department, Southern Railway, to which position he succeeded in 1931, and was appointed one of the company's delegates to the International Timetable & Through Carriage Conference. In 1938 he was appointed Deputy to Chief of Continental Passenger Section. In 1940 and 1941 he was attached to various Military Home Forces as Railway Liaison Officer, and in July, 1941, was appointed Acting General Assistant to the Docks & Marine Manager at Southampton Docks. Mr. Sinfield was until his appointment at Dover a member of the committee of the Southern Section of the Institute of Transport.

The Brush Electrical Engineering Co. Ltd. and Brush Coachwork Limited announce the resignation of Mr. W. M. Good from their boards. Mr. F. S. Mitman (Managing Director of the Brush Electrical Engineering Co. Ltd.) becomes Managing Director of Brush Coachwork Limited, in place of Mr. Good.

We regret to record the death on March 28, at the age of 77, of Mr. Harold Wright, Chief Metallurgist to Dorman, Long & Co. Ltd. since 1918. That company in 1944 instituted in his honour the Harold Wright triennial lecture, which is given by "an eminent authority in metallurgical, chemical or kindred subjects." Last year he was awarded the Bessemer Gold Medal by the Iron & Steel Institute.

We regret to record the death on March 29, at the age of 75, of Major-General Sir Henry Freeland, K.C.I.E., C.B., D.S.O., M.V.O., late R.E., who was a Director of the Barsi Light Railway Co. Ltd., 1928-45; of the Bombay, Baroda & Central India Railway Company, 1929-41 (and Agent of that company, 1920-25); and of the Madras & Southern Mahratta Railway Co. Ltd., 1930-44. Sir Henry Freeland retired from the Army in 1920.

Mr. H. C. Greenfield, Stationmaster, Waterloo, Southern Railway, retires on May 1, and is succeeded by Mr. E. Matthews, Stationmaster, Clapham Junction.

Mr. F. P. Vandertaelen, who has been appointed Chief Traffic Manager, Great Indian Peninsula Railway, started his railway career in 1921 in the Continental Department of the old London Brighton & South Coast Railway. Later, in the Continental Department of the Southern Railway, he held the post of Personal Assistant to the Deputy Continental Traffic Manager. He joined the Great Indian Peninsula Railway in 1928 as Assistant Traffic Manager, and, after service in various divisions, took over in 1934 the post in the head office of Superintendent of Claims, which he held more or less continuously until 1941. During that period Mr. Vandertaelen was placed on special duty with the East Indian Railway for two months to assist in the accumulation of claims arising out of the Bihta accident. After various periods of acting as Deputy Traffic Manager, G.I.P.R., and for two years as Deputy General Manager (Staff), he officiated on return from leave in 1945 as Divisional Transportation Superintendent for a period of seven months, before taking over his present post on August 28, 1945.

The following appears in *The London Gazette* dated March 26, under Territorial Army—Royal Engineers: Engineer & Railway Staff Corps:—

Henry George Ivatt (363277) to be Major, October 13, 1945.

Mr. Ivatt is Chief Mechanical Engineer, L.M.S.R.

Mr. H. H. Dyer

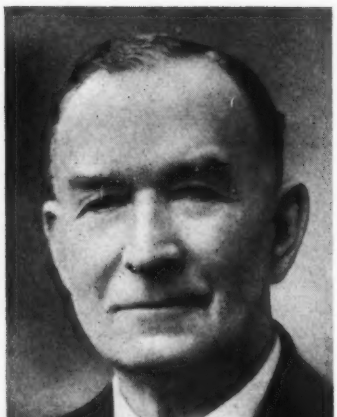
Elected President, Institution of Railway Signal Engineers

Mr. R. E. Sinfield

Appointed Divisional Marine Manager, Dover, Southern Railway

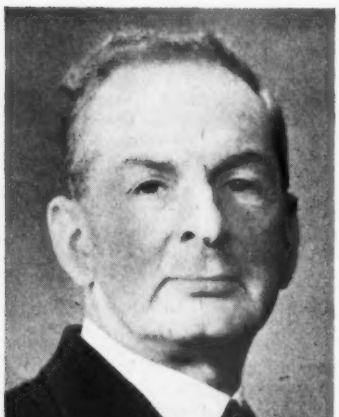
Mr. F. P. Vandertaelen

Appointed Chief Traffic Manager, Great Indian Peninsula Railway



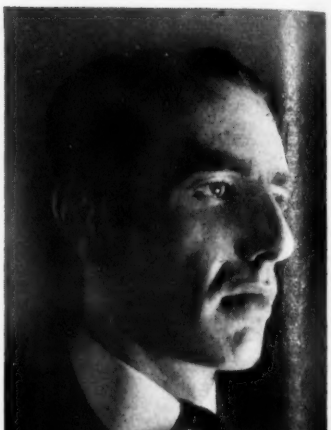
Mr. E. Falconer

Goods Terminal Superintendent, Chief Operating Manager's Office, L.M.S.R., 1934-46



Mr. R. Hunter

Appointed Goods Terminal Superintendent, Chief Operating Manager's Office, L.M.S.R.

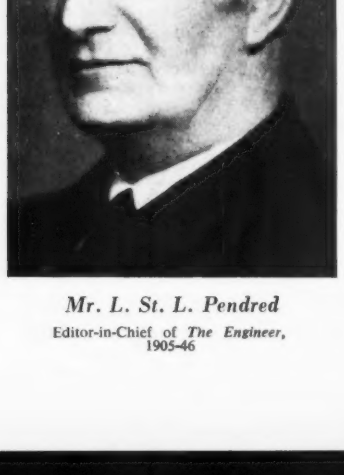


Mr. Geoffrey A. Towle

Assistant Hotels Superintendent, L.M.S.R., who is shortly leaving the L.M.S.R. Hotel Services

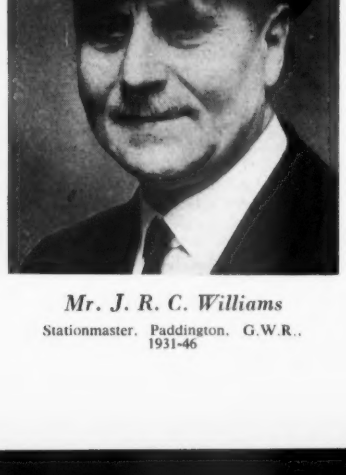
Mr. E. Falconer, who, as recorded in our February 1 issue, retired from the position of Goods Terminal Superintendent, Chief Operating Manager's Office, Watford H.Q., L.M.S.R., on February 28 last, was educated at the Secondary School and Technical College at Derby, and at Sheffield University, where he took a course in electrical engineering. He also occupied first place in the special two-years' course on economics arranged under the auspices of the Sheffield University for Midland Railway staff. In 1896 he entered the Chief Goods Manager's Office, Midland Railway, at Derby, and, from 1901 onwards, obtained varied experience throughout the line as relief clerk and agent. Mr. Falconer was placed on special duty in the Chief Goods Manager's Office in 1912 in connection with the reorganisation of the clerical staff and work throughout the system, and in 1916 he was appointed Assistant to the London Goods Operating Superintendent. His final position on the Midland was as London Goods Operating Superintendent, which he held from 1919 until the amalgamation in 1923. During his tenure of these offices a modern system of cartage control for London was introduced. Thereafter Mr. Falconer became Goods Assistant to the General Superintendent, Midland Division, L.M.S.R., at Derby, and was transferred in the next year to Euston as Station Operating Assistant to the Chief Goods Manager. In 1927 he was appointed Road Transport Assistant, and, in 1930, Outdoor Assistant to the Chief Goods Manager. He was appointed Goods Terminal Superintendent, Chief Operating Manager's Office, in 1934. It was during his occupancy of this latter position that the L.M.S.R. embarked on the research and experimental work which led to the reorganisation and modernisation of a large number of goods stations throughout the system, culminating in the revolutionary methods of handling miscellaneous goods traffic which were adopted on a large scale at Derby (St. Mary's) and Birmingham (Lawley Street)), both of which have been described in *The Railway Gazette* (the latter in our issue of January 4 last), and the conception and design of which were the work of Mr. Falconer.

Mr. R. Hunter, Deputy Goods Terminal Superintendent, Chief Operating Manager's Office, Watford H.Q., L.M.S.R., who, as recorded in our February 1 issue, has been appointed Goods Terminal Superintendent, Chief Operating Manager's Office, Watford H.Q., joined the Caledonian Railway as passenger clerk at Law Junction in October, 1900. After three years he was transferred to Wishaw Goods Station and in 1906 was appointed to the staff of the General Goods Manager at Glasgow. Later, he served on the staffs of the Outdoor Goods Manager, the Western District Goods Manager, and the Chief Goods Manager of the Caledonian. Mr. Hunter became Chief Clerk in the office of the Edinburgh District Traffic Superintendent in October, 1922, and was appointed



Mr. L. St. L. Pendred

Editor-in-Chief of *The Engineer*, 1905-46



Mr. J. R. C. Williams

Stationmaster, Paddington, G.W.R., 1931-46

Photo] [*Lafayette*

The late Mr. John Marchbank

General Secretary, N.U.R., 1933-42; Director, British Overseas Airways Corporation, since 1943

Goods Agent at Edinburgh, L.M.S.R., in November, 1928. In 1937 he became District Goods & Passenger Manager, Motherwell, and in 1943 District Goods, Passenger & Docks Manager, Barrow. In 1944 he was appointed District Goods & Passenger Manager, Sheffield, and in 1945 went to Watford as Deputy Goods Terminal Superintendent, Chief Operating Manager's Office.

Mr. Geoffrey A. Towle, Assistant Hotels Superintendent, L.M.S.R., is shortly leaving the L.M.S.R. Hotel Services. A son of Mr. Arthur Towle, he joined the Navy in 1916 as a cadet, and went through the R.N. Colleges at Osborne and Dartmouth. Subsequently he transferred to the engineering branch and completed courses at Greenwich and Keyham, and passed his examinations. He retired from the Navy in 1926 and joined the L.M.S.R. Hotel Services. In 1930 he was appointed Assistant Controller, Northern Area, Hotels & Refreshment Rooms. In 1935 he was transferred to the Head Office in London as Controller's Principal Assistant. In the autumn of that year he went to South Africa to initiate the arrangements for the high-class restaurant run by the L.M.S.R. at the Exhibition at Johannesburg. He went out again in the summer of 1936, taking with him two or three key members of the staff, in order to set up the organisation, including the supervision of the building of the restaurant, and the arrival of the furnishings and equipment from England, and in order to make local arrangements for the purchasing of stores. He flew back to England in time to allow his father, Mr. Arthur Towle, to go out for the opening, and subsequently acted temporarily as Controller of L.M.S.R. Hotel Services during his absence.

Mr. Loughnan St. Lawrence Pendred, C.B.E., Hon.M.I.Mech.E., who, as recorded in our last week's issue, retired on April 1 from the position of Editor-in-Chief of *The Engineer*, had served that journal for fifty years. He became Editor in 1905 in succession to his father, Mr. Vaughan Pendred, who had been Editor for forty years. Mr. Loughnan Pendred is to be succeeded by his son, Mr. Benjamin Pendred. Mr. Loughnan Pendred was born in 1870, and received his technical education at the Central Institution, South Kensington, and the Finsbury Technical College. His apprenticeship was served with Davey, Paxman & Co. Ltd., of Colchester, and afterwards he went to the works of Van den Kerchove at Ghent, and later to the old Western Railway of France. In 1893 he joined the Ordnance Department of Sir W. G. Armstrong, Mitchell & Co. Ltd., at Elswick. In 1896 he joined *The Engineer*. During the war of 1914-18 he edited, in addition to *The Engineer*, the *Ministry of Munitions Journal*. Mr. Pendred became President of the Institution of Mechanical Engineers, of which he is now an Honorary Member, in 1930-31. He is a founder Member of the Newcomen Society, of which he has twice been President, and he was President of the Institution of Engineers-in-Charge, 1926-28. He is an Honorary Member of the Junior Institution of Engineers, and is a Member of the Iron & Steel Institute. In 1934 he was created a C.B.E. in recognition of his services to engineering.

Mr. J. R. C. Williams, M.B.E., who, as recorded in our last week's issue, retired on March 30 from the position of Stationmaster, Paddington, Great Western Railway, had held that post since 1931. He joined the company in 1898 at Abingdon, and, after gaining experience at stations in the Reading and London Divisions, was appointed Chief Goods Clerk at Didcot in 1903, and Stationmaster at Lambourn in 1905. He was appointed Assistant Stationmaster at Reading in 1915, and seven years later became Assistant Stationmaster at Paddington. In 1924 he was appointed Stationmaster at Plymouth (North Road), and, in 1928, Stationmaster at Taunton, which position he held until his appointment as Stationmaster at Paddington, in 1931. Mr. Williams was made an M.B.E. in 1944.

Mr. John Marchbank, whose death we recorded last week, was General Secretary of the National Union of Railwaymen from 1933 until his retirement from that position at the end of 1942. Since 1943 he had been a Director of the British Overseas Airways Corporation. He was born at Lambfoot, Dumfries, in 1883. At the age of 18 he became a porter in the service of the Caledonian Railway at Beattock. He left the railway and joined the Dumfries County Constabulary, but later re-entered the service of the Caledonian Railway as a shunter at Buchanan Street Station, Glasgow. He joined the Amalgamated Society of Railway Servants in 1906. He was a member of the Executive Committee of the N.U.R., 1916-18, and President of that body, 1922-24. Mr. Marchbank became Assistant General Secretary of the N.U.R. in 1925, and in 1933 was elected a Member of the Trades Union Congress General Council. In 1933 he was appointed General Secretary of the N.U.R. He became a Member of the London & Home Counties Traffic Advisory Committee in 1933; of the Transport Advisory Council (Road & Rail Traffic Act) in 1934; of the Railway Employment Safety Appliances Committee in 1934; and of the Standing Committee on Mineral Transport in 1934. Since 1935 he had been Vice-President of the International Transport Workers' Federation. The funeral took place on March 28 at Golders Green Crematorium. Mr. J. Benstead, General Secretary of the N.U.R., gave an address. Those present, in addition to family mourners, included:—

Lord Portal, Chairman, Sir James Milne, General Manager, and Mr. K. W. C. Grand, Assistant General Manager, Great Western Railway; Messrs. S. J. Marchant, Principal Assistant to Chief Officer for Labour & Establishment, and J. E. Wood, District Locomotive Superintendent, Kentish Town (representing the Superintendent of Motive Power), L.M.S.R.; Mr. H. H. Halliday, Principal Assistant for Staff, Chief General Manager's Office, L.N.E.R.; Messrs. O. Cromwell, Chief Officer for Labour & Establishment (also representing Sir Eustace Missenden, General Manager), and F. Gilbert, Deputy Chief Officer for Labour & Establishment, Southern Railway; Lord Winster, Minister of Civil Aviation; Lord Walkden; Sir Harold Howitt, Deputy-Chairman, Lord Burghley, and other representatives of British Overseas Airways Corporation; Lt.-Colonel Sir Alan Mount, Chief Inspecting Officer of Railways, Ministry of Transport.

Mr. Reginald Pugh has been appointed Secretary to the Institution of Railway Signal Engineers.

Mr. Robert Shone has been appointed Secretary of the British Iron & Steel Federation. He will combine this appointment with directorship of economic work of the B.I.S.F. During the war Mr. Shone was General Director of Statistics, Costs & Prices, Iron & Steel Control.

Lt.-Colonel W. Wallace, late Royal Engineers, has been appointed Railway Adviser to the Greek Government in the British Economic Mission.

G.W.R. Appointments

Chief Goods Manager's Department

Mr. C. Furber, Mineral Traffic Manager & Development Agent, to be Deputy Chief Goods Manager & Mineral Manager.

General Manager's Office

Mr. H. G. Bowles to be Chief Clerk, General Managers' Office, Paddington.

Superintendent of the Line's Department

Mr. W. T. Geden, Stationmaster, Reading, to be Stationmaster, Paddington.

Mr. W. H. Holmes, Yardmaster, Old Oak Common, to be Stationmaster, Reading.

Chief Mechanical Engineer's Department

Mr. H. Randle, Assistant Works Manager, Locomotive Works, Swindon, to be Works Manager, Carriage & Wagon Works, Swindon, on retirement of Mr. E. T. J. Evans.

Mr. A. G. Snell, Assistant Divisional Locomotive Superintendent, Wolverhampton, to be Divisional Locomotive Superintendent, Oswestry, on retirement of Mr. F. W. Harris.

Mr. L. G. Morris, Assistant Divisional Locomotive Superintendent, London, to be Divisional Locomotive Superintendent, Worcester, on retirement of Mr. R. J. Armstrong.

Mr. V. J. H. Webb, Works Manager, Stafford Road Factory, Wolverhampton, to be Divisional Locomotive Superintendent, Wolverhampton, on retirement of Mr. R. H. Grey.

Mr. R. H. N. Bryant, Progress Organiser, Locomotive Works, Swindon, to be Works Manager, Stafford Road Factory, Wolverhampton.

Mr. H. G. Johnson, Assistant to Works Manager, Locomotive Works, Swindon, to be Assistant Works Manager, Locomotive Works, Swindon.

Mr. W. N. Griffiths, Assistant to Divisional Locomotive Superintendent, Cardiff, to be Assistant Divisional Locomotive Superintendent, Wolverhampton.

Mr. S. A. S. Smith, Assistant to Divisional Locomotive Superintendent, London, to be Assistant Divisional Locomotive Superintendent, London.

Mr. J. C. Metcalfe, Locomotive Shopping Controller, Swindon, to be Works Manager, Locomotive Works, Caerphilly.

Architect's Department

Mr. H. E. B. Cavanagh to be Assistant to the Architect, Paddington.

Chief Engineer's Department

Mr. R. H. Cunningham, Assistant Divisional Engineer, Paddington, to be Resident Engineer, Chief Engineer's Office, Paddington.

Mr. S. Stevens, Assistant Divisional Engineer, Cardiff, to be Assistant Divisional Engineer, Paddington.

Mr. F. L. Lambert, Assistant, Divisional Engineer's Office, Gloucester, to be Assistant Divisional Engineer, Cardiff.

Signal & Telegraph Department

Mr. L. F. Baker, Head of Staff Section, Signal & Telegraph Engineer's Office, Reading, to be Chief Clerk, Signal & Telegraph Engineer's Office, Reading.

Police Department

Mr. A. W. Jordan, Divisional Police Superintendent, Birmingham, to be Divisional Police Superintendent, Cardiff.

Mr. S. W. Holmes, Chief Inspector, Swansea, to be Divisional Police Superintendent, Birmingham.

Ministry of War Transport Accident Report

Woking, Southern Railway, November 10, 1945

Colonel A. C. Trench inquired into the collision which ocurred at 5.32 p.m. on November 10, 1945, at Woking, Southern Railway, when the 5 p.m. steam passenger train, Waterloo to Exeter, consisting of 10 bogie coaches drawn by 4-6-0 locomotive No. 452, ran into the rear of the 4.54 p.m. steam passenger train, Waterloo to Basingstoke, consisting of 8 bogie coaches drawn by 4-4-0 locomotive No. 119, as the latter was moving away after stopping at the down through home signal. The guard of the leading train and 22 passengers in it were injured: the engine crews of both trains suffered minor injuries. The relative speed of the two trains was about 20 m.p.h. The trailing end of the last coach of the leading train was telescoped about half its length; the solebars were thrust apart by the colliding engine, which came to rest about 140 yd. ahead of the point of collision, having driven the other train ahead. The engine of the latter broke from its train and stopped 400 yd. ahead. It was clear and dark; the rail was probably wet.

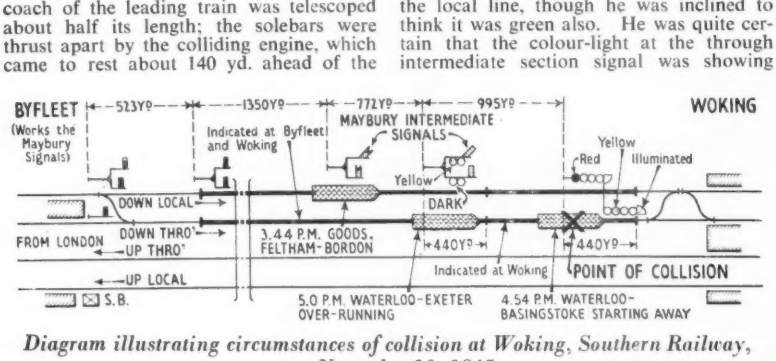


Diagram illustrating circumstances of collision at Woking, Southern Railway, on November 10, 1945

The accompanying diagram shows the line, signals and certain other details concerned in the case. The Byfleet signals are semaphores and the Woking signals colour-lights with junction indicators. Between the two places there are intermediate section signals, known as the Maybury signals, with relative distants, worked from Byfleet, the former having colour-light—yellow and green—signals, normally dark below, in accordance with Southern Railway practice where semaphore and colour-light areas adjoin. The Maybury section stop signals originally had intensified oil lamps, which had to have the lenses frosted during the war, but in 1943 these were replaced by the company's ordinary long-burning lamps, in general use on the line. The Maybury distants always had lamps of this kind. All four lamps are repeated in Byfleet box by a single light repeater. Sykes's lock-and-block is in use between Byfleet and Woking with rotation locking between advanced starting and intermediate signals. The track circuits between the Maybury stop signals and a point 440 yd. ahead of Woking down homes lock the Woking Sykes plungers. It is seldom necessary to hold a train at the intermediate section signals.

Origin of the Collision

The driver of the first train had a clear run and found the Maybury distant off with yellow colour-light at the intermediate section signal. He could not remember whether he saw the green light from the semaphore, but did see the arm itself; he thought the glare of the colour-light tended to obscure the semaphore lamp. He stopped at the Woking home at about 5.28 p.m. and got yellow with junction indicator about 2 min. later. He had moved forward rather more than a train's length when he was thrown down. The fireman had seen the yellow light at the Maybury intermediate signal and said one was displayed for the down local line also; he could not recollect seeing the semaphore lights. The guard had not seen the Maybury signals; he was satisfied that his tail lamp was showing a good light and the Byfleet signalman confirmed this.

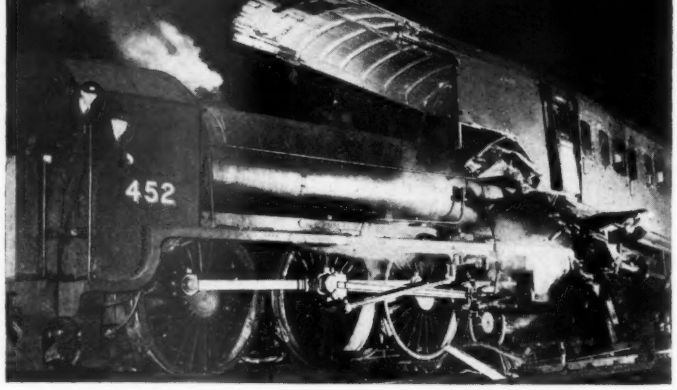
The driver of the colliding train found all the Byfleet signals clear. The through-line Maybury distant was, he said, green, but he could not be sure of the one for the local line, though he was inclined to think it was green also. He was quite certain that the colour-light at the through intermediate section signal was showing yellow, changing to green before he reached it. He did not see the semaphore above or its light and did not recollect the aspect showing for the local line. The Woking home signal was yellow when he first saw it, with diversion sign showing for through to local. He estimated he was running at 60 m.p.h. and was surprised to see the diversion indicated; he made a brake application because of the speed restriction through the crossover. The engine was not steaming and smoke was beating down as he approached Woking. He saw the tail lamp two or three engine lengths away and made a full brake application, reducing speed to about 25 m.p.h. at the moment of impact. The fireman confirmed the driver's statement about the aspects displayed by the colour light at the intermediate signal, but the guard did not see any of the Maybury signals.

The driver of a goods train running at 15 m.p.h. on the local line had the Byfleet signals off. He saw good lights in the Maybury distants, green for the local and yellow for the through line. About this time he was passed by a train on the latter line and smoke obscured his vision. He later saw a yellow in the local line colour-light at the intermediate section signal with green in the semaphore above it. No colour-light was displayed for the other road nor could he see any light in the arm above it. Approaching the intermediate signals he could see both Woking home signals at red. Seeing flashes and sparks he approached them cautiously and saw someone coming towards him with a lamp. He stopped 200 yd. in rear of the Woking signals and about level with the tail lamp of the colliding train. The guard confirmed the driver's statement and was sure that no colour-light was displayed at the down through intermediate.

Time of Collision

The signalman at Byfleet said the first train passed in the usual way and the signals were all duly replaced behind it. He accepted the Exeter train and cleared the Byfleet signals for it, but tried to keep the intermediate signals "on" as he had not received "train out of section" for the Basingstoke train. The train passed and he was waiting to be able to offer it forward when he noticed it had cleared the track circuit in rear of the intermediate signal, and realising that it had overrun the latter sent "vehicles running away." The signalman at Woking observed the track circuit in rear of the home signal become occupied by the Basingstoke train and later set the crossover for it to pass to the local line. The collision must have occurred immediately after he received "vehicles running away." Consideration of times booked at Woking and Byfleet Junction—no block register is kept at Byfleet—convinced Colonel Trench that both the Exeter train and the goods train were well within range of vision of the Maybury signals at the moment the former passed the latter.

The Byfleet signalman said that when he came on duty at 3 p.m. his light repeater for the Maybury signals was showing "out." He did not report this as he had found it showing "out" on a number



View taken shortly after the accident at Woking, Southern Railway

of occasions and reported it to the lineman, who put it right, but sometimes it remained right only for a few hours. He therefore made it his practice when "out" was indicated to go down to the platform and look for the lights. If he could see all four he disregarded the indication. He went down about 5 p.m. and was satisfied that he could do this. The Woking lampman said he had trimmed the lamps about the previous mid-day. He did this regularly on Fridays and inspected again on Tuesdays. (The accident occurred on a Saturday). He had on various occasions found soot, forming sometimes a hanging cone over the flame. After renewing the wicks and refilling with oil from the Woking container, which was not nearly empty, he carried the lamp interiors to the signals, checked the flame height and found it satisfactory. He had had many years' experience as lampman. Immediately after learning of the accident he looked from the up platform and could see the backlights of both intermediate section signals. A chief lineman, testing the locking at Byfleet at 9 p.m. observed the indicator showing "out," and shortly after a sub-inspector went to those signals and could see neither front nor back light in the through line signal from a short distance. The light in the local line signal was satisfactory. Later still he climbed the post and found "a tiny red glow" in the through line lamp" and a stalactite of carbon about 2½ in. long hanging from the expander bar right down to the burner; no appreciable light could be seen. The stalactite fell to pieces as he touched it and wind extinguished the lamp. He relit it, found it was smoking, turned it down a trifle and thought it was burning satisfactorily. A lineman inspected the lights in the intermediate distants at 2 a.m. next morning and found them rather sooted up. The through distant was visible only at about 100 yd.; the intermediate section signals were seen showing good lights. At noon he inspected the latter and found the through light almost invisible, due to a hanging cone similar to that found by the sub-inspector. The local light was not so bad, but the lamp sooty. In both the repeater contact was open.

Inspecting Officer's Conclusion

It may be accepted that the through intermediate section signal was at stop, with the lamp sooted so as to render the light invisible, and, further, that there was only one yellow light displayed, which was for the local line. Colonel Trench concludes that the driver of the Exeter train mistook that light as being a signal for the through line, perhaps unconsciously influenced by seeing in the distance the Woking through home at yellow. He finds it impossible to credit the statement that the aspect changed to green before he passed it. Probably the through Maybury distant was showing a dim yellow light and his vision may have been hampered by smoke beating down, with the result that he took the green light in the local distant as his. A driver since 1920, with 41 years with the company, he has a clear record.

The Byfleet signalman admitted that with the "light out" indication showing he should not have permitted trains to proceed beyond his advanced starting signals. He said he was satisfied that all four Maybury lights were showing. Colonel Trench accepts his statement that he looked for them, but thinks he could not have seen all four; in the circumstances he must accept some responsibility. Twenty-five years with the company, he has been porter signalman since 1931 and has a good record with an award for alertness.

The guard of the colliding train failed to carry out Rule 148 (*a*). Despite preoccupation with his journal—four copies had to be prepared—the approach to Woking was clearly one of the occasions described in the rule. He should have looked for signals, in which case it would have been possible for him to take action in time to rectify the driver's mistake. He cannot be relieved of all responsibility. With 41 years' service, 22 as passenger guard, he has a clear record.

Colonel Trench found it impossible to determine the reason for the sooting of the lamps. The repeated sooting seemed to point to poor quality oil. The lampman is given the benefit of the doubt, but it is difficult to credit his statement that he saw both backlights clearly from Woking platform.

Recommendations and Remarks

Any abnormality in the *pattern* of the lights displayed to a driver at any particular location is liable to be misleading. The point is particularly important in this case, as the colour lights, so much brighter than ordinary lamps, tend to blot out any such lamps on an adjacent post. "Intensified" oil lamps have now been installed at the intermediate signals. With proper attention and satisfactory oil they should, as before the war, meet all requirements. Colonel Trench makes no recommendation therefore in this respect. It will be necessary to emphasise to signalmen that they must in future accept and act on the "out" indication of the repeater. In the event of continuance of the trouble, separate repeaters for through and local roads should be provided, making the circuits less delicate and halving the inconvenience caused by failure. The amount of heat from long-burning lamps is small and the range of expansion of the detecting element between "in" and "out" is strictly limited, giving rise to "out" being indicated when the signal is showing a reasonable light, though the flame is giving insufficient heat to close the expander contacts. As a result there is a risk of the apparatus being regarded by signalmen as unreliable and a defective light remaining undetected. These inherent difficulties have been aggravated by the absence during the war of the specially refined oil used in these lamps. The substitute oil has given difficulty in providing enough heat without producing soot which may virtually extinguish the light.

The use of apparatus which may be suspect by the men for whose benefit it is provided is undesirable. There appears to be a field for investigation into the use of a heat repeater with a wider range of expansive movement and eliminating extraneous temperature variations from the lamp case itself. The signalman concerned in this case on a number of occasions over a considerable period had found his repeater indicating "out" when he had reason to think it was incorrect; complaints to the lineman resulted in rectification in each case, but had not effected a permanent cure, with the result that the reliability of the apparatus had become suspect in the minds of the signalmen. The proper course, with two departments and staff of two stations concerned, would have been for the signalman to have reported the recurrent trouble to the stationmaster, who would in turn report to the Divisional Superintendent in order that the matter might be further investigated.

Probably the only possible action, pending reversion to pre-war quality oil, would have been to explain the facts to the signalmen, emphasise that they must invariably accept the repeater indications and not allow trains to proceed beyond the advanced starting signals pending acceptance. Colonel Trench suggests making certain that all staff realise that it is their duty as well as interest to see that any such apparent irregularities, if not put right, are reported to a responsible officer.

Early in the war it was found necessary to discontinue manufacture of the specially high-quality long-burning oil and, generally, the wartime oil has had a greater tendency to sooting, guarded against by more frequent inspection and using a slightly smaller flame Any reduction in the visibility of the lamps cannot but be a material handicap to drivers. Suppliers should be pressed to restore the pre-war oil as early as possible. The trouble in this case arose largely from the signalman's uncertainty as to whether a presumed failure was attributable to the lamp, or the repeater circuit, whether it was the lampman's or lineman's business. Instructions are being issued to clarify the action to be taken in such cases.

An unusual feature was that the leading engine travelled forward 400 yd., with regulator slightly open, despite parting of the train pipe. A fracture was discovered in a short length of flexible hose in the pipe line leading from the upper side of the tender and engine brake cylinders to the ejector, admitting air above the pistons and destroying all brake effect. The final opening of the hose must have been caused by the impact of the collision as the brake was satisfactory at Waterloo and throughout the journey. Warning automatic control probably would have prevented the accident, largely attributable to war conditions.

Railway Progress

A lecture entitled "Railway Progress," illustrated with colour films, was given to the Southern Railway Lecture & Debating Society on March 7 by Mr. J. R. Hind, British Railways Press Officer. Colonel Eric Gore Browne, Chairman of the Southern Railway Company, presided.

Mr. Hind said that the railways made such rapid progress in the ten years 1929-39 that on the outbreak of war they were in first class condition to meet the tasks confronting them. Progress went on even during the war, two of the most outstanding happenings being the introduction of the Southern Railway "Merchant Navy" class locomotives and the first electric freight locomotive. War conditions themselves led to new ideas, new methods of operating, improvisation, and adaptation. The highly skilled craftsmanship and the good materials ordered in peacetime stood up extremely well to the worst the enemy could do, and it was a certain fact that if the railways had not been in such good shape when the war began, the hammering they received from enemy action, and the colossal loads they carried, would have left them in much worse condition.

The railways were now ready to carry out improvements that would provide this country with the finest services in the world. They faced reconstruction tasks which exceeded in magnitude those of almost any other industry in the country. Restoration would take time, and it had to be remembered that railways worked continuously 24 hr. a day, year in and year out, and there was no closing down for overhaul as in some industries.

Mr. Hind concluded his lecture by showing some films illustrating pre-war railway achievements, the wartime headquarters of the Railway Executive Committee, and some scenic attractions of Great Britain which might appeal to "overseas visitors with dollars to spend."

Isle of Man Railway Company

The ordinary general meeting of the Isle of Man Railway Company was held at the offices of the company on March 13, Mr. R. Q. Hampton, M.H.K., Chairman of the company, presiding.

The Chairman, in the course of his address said:—Up to July, our receipts were on an expanding scale, owing to the extension of training centres, prisoner-of-war camps, and last, though not least, the establishment of the Royal Naval Air Station at Ronaldsway. This is an airfield of considerable magnitude laid out in the most modern manner, and with the necessary amenities for civilian air travellers it could easily become a valuable terminus for aerial transport.

With the end of the war, prisoner-of-war camps quickly disbanded, service personnel were withdrawn, the heavy traffic entailed in their supply and maintenance decreased, and the latter part of the year reverted in a few weeks to the pre-war winter level.

The total receipts for the year, however, have closely approached the previous highest records of the company, and your directors, like those of other utility companies in Manxland, earnestly hope that the coming season may prove sufficiently remunerative to absorb, as in pre-war years, a winter loss in working into an economical total for the year.

We have found by past experience that there is a certain limit of increase in fares and rates beyond which, if imposed, traffic decreases. Unfortunately, our overhead charges during the winter do not decrease correspondingly with the lesser receipts from traffic. Our hope is that the coming season may as swiftly expand as wartime conditions have declined without any stagnant or part-time gap.

We intend, therefore, as far as our resources allow, to prepare for the handling of a traffic equal to the pre-war average. As fast as labour and materials become available, we intend reconditioning our rolling stock, carrying out unavoidably deferred maintenance, and restoring—and, we hope, improving at the same time—the system to the efficiency which has in the past enabled it to cope with the heavy demands of seasonal traffic.

We have had six years of greatly accelerated wear and tear, with time for only vital overhauls. We are now awaiting delivery of new boilers for instalment in our engines. These are from the makers of our locomotives, Beyer Peacock & Co. Ltd., and in addition this well-known firm has in hand proposals for a new type of locomotive for service on our lines.

Our subsidiary company is making equal efforts. A Bill enabling the use of double-deck stage coaches has recently passed the Legislature, and Isle of Man Road Services has a number of these vehicles on order. The wartime congestion of traffic has eased considerably, but we hope this type of bus may prevent a recrudescence of it when the season starts. A decision of the English Transport Minister laid it down that this class of vehicle should be manufactured in priority—in fact, no suitable single-deck buses would be available for some time—and we hastened to place what orders could be accepted.

Our biggest expenditure is wages, which accounts for 9s. 4d. out of every £1 we earn. In recent years, considerable advances have taken place, and our wages bill for the railway alone is £21,000 a year greater than before the war, or nearly double the pre-war cost.

Fortunately we had extra traffic during the war to enable us to meet this increased expenditure, but the special traffic has now largely disappeared, and on the other hand further demands for increased wages are being made, and additional costs are envisaged by proposed legislation. If we are to work without loss, a larger volume of traffic must be handled, or rates and fares must be further increased.

I think, in this connection, I should point out that in the six years of war this company has done a magnificent piece of work. During this period we ran 14,000 special trains for military and other requirements. In the years when we were not allowed to publish our accounts or details of our business operations, the weight of heavy goods handled, distributed and collected was tremendous. During 1945 we carried 1,250,000 passengers, and if one reflects that this has been accomplished with safety on a single-track system, one can imagine the unremitting care and attention that made it possible.

Your directors gratefully acknowledge the efficient and loyal labours of the servants of the company. We thank our General Manager, Mr. A. M. Sheard, the heads of our office and audit departments, our engineering, permanent way and traffic superintendants, the stationmasters, and all the staff, for the fine way in which they have contributed to a long and arduous effort.

The report and balance sheet have been in your hands for some time, and with your permission I will take them as read. You will see our receipts for the year show an increase of £5,764, but the expenditure has also risen by £5,245, almost balancing the added earnings. The balance of receipts over expenditure, £20,918, carried to net revenue account, plus interest on investments, general interest, and the balance brought from the previous year, after deduction of debenture interest and rent charges, makes the disposable sum of £21,188. Out of this your directors have transferred to reserve funds the amount of £13,000. This is an imperative measure to prepare for the restoration before us.

Out of the balance, £8,188, your directors recommend a dividend on the preference shares at 5 per cent. per annum, absorbing £2,500, and a dividend on the ordinary shares at the rate of 2½ per cent., absorbing £3,500, leaving a balance to be carried into the present year's working of £2,188, being £260 more than the amount brought into 1945.

The report and accounts were adopted.

F.B.I. Conference on Industry and Research

At a conference held by the Federation of British Industries at Kingsway Hall, London, on March 27 and 28, and formally opened by Sir Robert Robinson, President of the Royal Society, more than 1,000 delegates representing organised industry considered problems arising from the application of science by industry.

Sir Clive Baillieu, President of the Federation and Chairman at the opening session of the conference, said that this country was fortunate in having maintained a foremost position in the field of scientific discovery and research. Although this provided us with the fundamental equipment necessary for the efficient conduct of industry, such a position could only be maintained by converting the results of scientific discoveries into efficient production.

Sir Robert Robinson said that the problem of providing scientific manpower was pressing. We needed more universities with scientific departments and more technical colleges, so that science and technology would permeate every section of industry, and not just filter through from research laboratories.

Sir William Larke, Director of the Iron & Steel Federation and Chairman of the Research Committee of the Federation of British Industries, expressed the view that in our efforts to increase the volume of exports, we must develop export trade in the products of industries in which the results of recent scientific research were embodied.

Survey of Scientists

A recent survey made by the Federation of British Industries, continued Sir William, had established that we had at the present time some 9,000 graduate scientists engaged in research and development in industry, and that the total expenditure in this direction was some £20,000,000 a year. Those industries which had contributed to this survey proposed in the next two years to increase research staff by 25 per cent. and to extend laboratory space by some 2,000,000 sq. ft.

The industrial research associations had proved a valuable factor in bringing together science and industry and in stimulating an active interest in the scientific method of industrial practice. There were now 30 associations working under the ægis of, and in collaboration with, the Department of Scientific & Industrial Research. Their annual expenditure was over £1,000,000, and plans were in progress to pass the £2,000,000 mark within the next five years. One great advantage of this movement was that industries with a small turnover and small financial resources were in a position to take advantage of the collective facilities thus made available.

Sir Edward Appleton, Secretary of the Department of Scientific & Industrial Research, advocated what he described as "objective fundamental research" which differed from fundamental research in that it had an ultimate practical end in view, although its immediate results might not have direct application.

Railway Research

Sir Harold Hartley, Member of the British Overseas Airways Corporation, reminded the delegates that he had recently ended active participation in the research departments of the L.M.S.R. and the Gas Light & Coke Company, and had had the satisfaction of watching the research laboratories of these two companies gradually take their proper place as living organisms. To cover the wide scope of its activities, the L.M.S.R. had a research department with six main sections, under a research manager, dealing with chemistry, physics, engineering, metallurgy, paint technology, and textiles.

In the past many industrial experiments had been made without a scientific plan. In this connection the L.M.S.R. research department had been most successful by devising new techniques and giving to its conclusions a certainty they could not otherwise have attained. The every-day operations of industry were in fact a series of large-scale experiments, and it was a function of the research department to see that lessons were neither lost nor obscured.

Sir Ernest Simon, Chairman of the Council of Manchester University, said that one problem was the provision by the universities of a greatly increased number of scientists, and the task before the provincial universities was to double the num-

ber of their science graduates in ten years without lowering standards.

Mr. John Wilmot, Minister of Supply & Aircraft Production, said that on the response made by the British industrialist to the opportunities offered by science at all times, the industrial future of this country depended.

Mr. Herbert Morrison, Lord President of the Council, who was the Chairman at the morning session on March 28, said that practically all the main industries were now covered by research associations working in conjunction with the Department of Scientific & Industrial Research, and new associations were being created.

Sir John Anderson, the Chairman at the final session, expressed the view that on the whole the attitude of industry towards science now left little to be desired. In his opinon, however, the higher teaching of science was directed too exclusively to the creation of specialists.

Sir William Larke, summing up the proceedings of the conference, submitted a resolution, which was passed, that the competitive power of British industry must be firmly secured, to achieve which it was essential to maintain technical pre-eminence in design, quality, and production, and that every industrial concern should make the greatest possible use of scientific knowledge.

It was also agreed that the use of science in daily industrial life would require the progressive growth of industrial research facilities. An essential factor in pursuing these aims was increased facilities for training scientists and technicians. Another resolution used the Government to give higher priorities to the provision of essential buildings and research workers.

Institution of Locomotive Engineers

The annual luncheon of the Institution of Locomotive Engineers was held at the Connaught Rooms, Great Queen Street, W.C.2, on March 29. Mr. W. S. Graff-Baker, the President, was in the Chair.

Mr. J. A. Kay, Editor of *The Railway Gazette*, proposing the toast "The Institution of Locomotive Engineers," said he doubted if any of the few locomotive enthusiasts who were responsible for the founding of the Institution 35 years ago thought it would become the eminent institution it was today. The first C.M.E. of a large railway to become a President had been Sir Henry Fowler. Ever since, the Institution had had a succession of eminent locomotive engineers as presidents. There were some institutions which attracted a very large attendance at the annual dinner, but not so many at the reading of papers. That was not the case with the Institution of Locomotive Engineers. He had notice, too, that the 35 years' life of the Institution of Locomotive Engineers had been contemporaneous with the revived interest in the locomotive by the railway companies themselves. There had been a revival in the practice of naming locomotives.

Mr. Graff-Baker, replying to the toast and proposing the health of the visitors, said that during the time he had been President the "health" of the Institution of Locomotive Engineers had been good, for the Institution had gone from strength to strength. Its membership was now 1,720 and over 100 electees had presented themselves during the past twelve months. There could be no better testimony to the prestige which the Institution enjoyed. Last year there had been a record attendance of 307 at the annual luncheon. At the present function there were 372 persons present. Mr. Kay, in his speech, had referred specifically to locomotives. Under the charter of the Institution, its members were concerned with all manner of transport.

Brigadier-General Sir H. Osborne Mance, responding for the guests, said that it was 15 years since he first attended functions of the Institution as a guest. It was not until he had been rung up and asked to respond for the guests, that his worries had commenced. He had little knowledge of locomotives. What he had, he had learned early, for it was in 1897 or 1898, as a young sapper officer, that he had visited Swindon works in search of railway knowledge.

Among those present were:—

Messrs. N. Ablett, F. W. Abraham, E. Adams, W. A. Agnew, F. Akast, T. J. Aldridge, L. B. Alexander, H. W. Andrews, S. Appleyard, G. Arnott, W. J. Ash, Captain E. S. Aslett.

Mr. G. Bailey, Lt.-Colonel R. G. Bamford, Messrs. J. H. Bance, L. Barker, H. H. C. Barton, A. E. Beacham, F. H. Beasant, J. E. Beckett, R. A. Beckett, A. J. Beedham, G. V. Beesley, F. W. Belcher, A. R. Bell, A. E. Bennett, M. G. Bennett, H. Bissell, J. E. Blackshaw, P. W. Bollen, C. J. H. Bolton, R. C. Bond, L. Boulton, A. J. Boyd, J. Briggs, G. C. Brinkworth, G. C. Brighton, H. R. Broadbent, D. C. Brown, D. F. Brown, Sir C. Bruce-Gardner, Messrs. O. V. S. Bulleid, M. G. Burrows, F. Burtt, L. W. Buxton.

Messrs. G. Callow, A. Campbell, N. J. C. Carling, H. R. Carver, H. R. Catterill, J. Cave, H. Charnley, J. Clayton, M.B.E., H. Clark, C. E. Cleaver, C. M. Cock, C. S. Cocks, G. C. Cocks, W. C. Cocksedge, F. H. Colebrook, Colonel G. Collingwood, Messrs. T. F. Coleman, A. F. Collins, Lt.-Colonel F. R. Collins, D.S.O., Messrs. N. H. Cook, A. E. Cook, B. W. C. Cooke, D. F. Cooper, R. S. Cooper, T. Cooper, P. Cooper, Lt.-Colonel C. G. Cotesworth, Messrs. H. P. R. Coveney, A. G. Corrie, B. J. B. Corrie, E. S. Cox, M. A. Crane, J. Crook, P. Croom-Johnson, Brigadier H. Crosland, Messrs. H. W. Crosthwait, J. D. Crozier, R. Curl.

Messrs. G. A. Dalton, A. C. C. Damant, A. S. Davidson, H. W. Davis, Damer Dawson, A. J. Day, A. L. B. Dawson, C. E. Dee, C. Dennett, S. R. Devlin, J. C. Dewhurst, P. C. Dewhurst, P. K. Dewhurst, E. L. Diamond, V. F. Dittrich, J. P. A. Drewry, V. H. Drewry, R. J. Drury, R. G. Duncan, C. E. Dunton, Major A. S. du Toit.

Messrs. F. O. Ellis, R. R. Ellis, D. V. Ellison, Evan Evans, W. B. Everard.

Messrs. C. N. Fairchild, W. D. Farrington, N. Fearon, A. Ferguson, C. E. Firth, Leslie Flatt, C.I.E., E. Fookes, R. E. Fordman, H. C. Foster, M. Foster, E. J. Fouracre, Brigadier F. E. Fowle, Messrs. B. D. Fox, J. Fox, W. S. Fraser, C.I.E.

Mr. J. R. Garner, Eng.-Cdr. H. V. Gaud, Messrs. H. F. S. Gedge, A. J. Gibson, R. K. Glascodine, D.S.O., R. T. Glascodine, G. E. Godfrey, J. N. Goldsby, M.B.E., A. P. Good, W. S. Graff-Baker (President), A. J. Grainger, T. R. Graty, N. Gray, E. W. Greaves, H. W. Green, T. E. Green, E. H. Greenly, T. Greenwood, Colonel H. Gresham, Messrs. J. H. Gresham, S. R. Gresham, R. Gresley, W. Griffith, H. W. Griffiths.

Mr. J. Hadfield, Lt.-Colonel R. E. Hagley, O.B.E., Messrs. S. Hague, N. Haigh, R. H. Hamilton-Wickes, C. D. Hanna, E. W. Hanslip, F. Harper, W. A. Harper, T. E. Harris, Major H. A. Harrison, F/L. John Harvey, Messrs. C. A. F. Hastilow, C. G. Hatherley, O.B.E., L. W. Hawkins, Captain B. T. Hemple, Messrs. N. B. Henderson, E. Hertel, H. A. A. Hicks, H. Holcroft, Dr. J. E. Holloway, Messrs. A. Honey, A. G. Hopking, C. P. Hopkins, W. G. Hornett, W. R. Hornett, F. L. Howard, E. P. Hubbard, H. W. Huggins, Colonel R. G. Hughff, Messrs. J. S. Hunter, D. Hurley, H. T. Hutchings.

Mr. A. C. Illston, Sir Godfrey Ince, K.C.B., Mr. H. G. Ivatt. Messrs. G. C. Jackson, A. E. Jenkins, P. J. Jessop, C. Johnson. Messrs. J. A. Kay, W. G. Kefford, W. Kelway-Bamber, H. E. Kemp, R. Kershaw, G. Kettlewell, D. R. Kimberley, H. T. H. Kingston, A. J. D. Kitson, C. F. Klapper, W. S. Knight.

Messrs. A. Larman, W. H. Lawrence, E. Lawton, H. Lawton, L. J. Le Clair, K. H. Leech, M. H. P. A. Levie, Lt.-Colonel J. D. Lewis, M.C., Messrs. Martin Lewis, E. E. Lloyd, M. Lloyd, W. D. Long.

Messrs. W. H. W. Maass, J. Pelham Maitland, M.B.E., Sir H. Osborne Mance, K.B.E., C.B., Messrs. A. W. Manser, R. E. Marks, S. W. Marsh, E. W. Marten, F. Mason, Cdr. H. M. E. Mathe, Major D. C. H. Mathews, Messrs. H. Matthews, R. Mayhew, H. G. McClean, A. B. MacLeod, J. W. McWilliam, Major H. Meadows, Messrs. J. P. Metcalfe, R. Metcalfe, R. D. Metcalfe, Lt.-Colonel W. A. Millar, Messrs. W. J. Mitchelhill, M. J. Moore, F. H. Morfey, N. H. Morris, A. Moulton, F. Munns, V. S. Mullen.

Messrs. O. S. Naylor, R. Needham, G. H. Negus, Major J. W. Norris. Messrs. R. Officer, P. M. Otway.

Messrs. J. Palmer, C. E. Parkes, C. R. Pasley, J. J. C. Paterson, C.I.E., R. P. Paul, S. J. Payne, Major I. K. F. Pearson, Messrs. K. R. Pearson, R. T. Pemberton, A. H. Peppercorn, Captain B. H. Peter, C.B.E., Mr. S. A. R. Phelps, Sir J. Pitkeathley, Messrs. T. Potter, J. R. Potts, E. C. Poultney, O.B.E., E. V. M. Powell, F. A. G. Powell-Jones, M.C., A. Price, D. C. Plyer.

Messrs. J. Rankin, R. C. Rattray, V. P. Rawlings, L. Reeves, H. P. Renwick, Captain N. F. Renwick, Messrs. H. W. H. Richards, A. Richardson, V.D., R. A. Riddles, C.B.E., J. L. Riordan, A. B. Robins, J. D. Rogers, G. Rollason, T. H. Rowe, W. J. Ruston.

Messrs. H. H. Saunders, O.B.E., Captain M. K. F. Saunders, M.C., Messrs. H. B. Saxby, W. J. Sedcole, E. W. Selby, K. W. Seton-Karr, C. N. Sharples, G. H. Sheffield, H. S. Shickle, G. S. Simmons, C. R. H. Simpson, F. W. Sinclair, W. O. Skeat, Deane Skurry, C. L. M. Smith, J. W. Smith, R. T. Smith, S. G. Smith, A. H. Sommer, A. K. Southern, J. E. Spear, J. C. Spencer, C. E. Spurgeon, C.B.E., Sir William A. Stanier, Messrs. H. L. Stew, W. Stewart, H. J. Stone, M.C., W. B. G. Swayne, N. H. Swinnerton.

Major R. L. Tanner, Messrs. P. N. Tarleton, A. R. Taylor, J. Taylor, W. T. Taylor, Major E. W. Taylerson, Messrs. J. W. Terry, Captain F. Theakston, O.B.E., Lieut. Eldick Thieme, Messrs. R. A. Thom, O.B.E., G. Thomas, R. E. Thomas, J. Thompson, C. Thornton, W. G. Tilling, F. Tipler, J. S. Tritton, E. B. Trotter, G. Turgett, E. M. Turnbull. Mr. E. A. Uzzell. Mr. J. W. Vaughan, O.B.E., Lt.-Colonel G. M. Vibart, O.B.E., Messrs. J. B. Vidal, M.C., J. W. Voelcker.

Messrs. C. C. Waddington, C. C. H. Wade, Captain W. J. Wakley, Messrs. A. L. Wallace, A. F. Walters, R. T. Warren, A. J. Watkins, Major O. W. Watkins, Messrs. H. S. Watkinson, N. C. Watney, W. L. Watson, C.B.E., A. J. Webb, Colonel F. Webb, Messrs. M. Weiss, D. W. Wells, G. M. Wells, F. Seymour Whalley, M.C., Colin R. White, H. B. White, I. Whittingham, J. A. Wilks, S. T. Willcox, F. Williams, W. Cyril Williams, Major W. A. Willox, Mr. H. Wilmot, Major W. R. Wilson, C.M.G., Messrs. A. J. L. Winchester, B. D. Wix, G. F. Wix, F. R. Wix, G. K. Wood, Lt.-Colonel E. Woodbridge, Messrs. J. B. Woodman, J. M. D. Wrench, C.I.E., Mr. H. Zetterstrom.

Notes and News

Colvilles Limited Dividend.—A dividend of 5½ per cent., less tax at 10s. in the £, is declared on the preference stock of Colvilles Limited for the six months ended March 31, 1946.

Sales Engineer (Railways) Required.—A manufacturer establishing new diesel-electric locomotive division invites applications for an appointment as assistant sales manager or senior sales engineer. For full particulars see Official Notices on page 395.

The Institution of Railway Signal Engineers.—The meeting announced for today, in our issue of March 29, at which a paper "Upper Quadrant Signals," by Mr. R. S. Griffiths, was to have been read, has been postponed until April 17.

Sales Engineer Required.—A firm of brake lining manufacturers in the North of England has a vacancy for a sales engineer. Applicants must have been apprenticed to the motor trade and have had drawing office experience. See Official Notices on page 395.

Ribble Navigation & Preston Dock Undertaking Vacancies.—The Corporation of Preston invites applications for the permanent appointment of an Assistant Traffic Manager and a Chief Inspector for the Ribble Navigation and Preston Dock Undertaking. For full particulars of these appointments see Official Notices on page 395.

Five More Green Line Coach Routes.—London Transport announces the introduction of five more Green Line coach routes as from Wednesday, April 3. Owing to continued shortage of staff in some areas, the services on two of these new routes will not be as frequent as the board intends ultimately to make them. The routes affected are 718 (Windsor and Epping) and 724 (High Wycombe and London), both of which will have an hourly service instead of half-hourly. The five new routes are as follow: Route 703, Amersham and London (hourly); Route 711, Reigate and Baker Street (half hourly); Route 718, Windsor and Epping (hourly); Route 722, Upminster and Aldgate (half-hourly); and Route 724, High Wycombe and Oxford Circus (hourly).

Institute of Transport April Luncheon.—A luncheon meeting of the Institute of Transport will be held on April 26 at the Connaught Rooms, Great Queen Street, London, W.C.2. The guest speaker will be the Rt. Hon. Lord Winster, Minister of Civil Aviation. Particulars of the arrangements may be obtained from the Institute, 15, Savoy Street, London, W.C.2.

Construction of Earthwork and Bridges on Chessington Lines.—A meeting of the Croydon Section of the Permanent Way Institution will be held on April 10 at Ruskin House (room 13), Wellesley Road, West Croydon, commencing at 7 p.m. A talk on "The Construction of Earthwork and Bridges on the Chessington Line" will be given by Mr. D G. Williams, B.Sc., A.M.Inst.C.E.

Institution of Railway Signal Engineers.—In consequence of the appointment (recorded elsewhere in this issue)) of Mr. Reginald Pugh, of 2, Caxton Street, Westminster, S.W.1, as Secretary to the Institution of Railway Signal Engineers, from April 1, all communications relating to the general business of that body should now be addressed to him (telephone, Abbey 6220). Subscriptions, payments and communications relating thereto should continue to be addressed to the Honorary Treasurer, Mr. T. S. Lascelles, at 26, Voltaire Road, Clapham, London, S.W.4, as hitherto.

Points of Contact Between Permanent Way and Signalling.—The next meeting of the London Section of the Permanent Way Institution will be held in the ballroom of the Charing Cross Hotel, Strand, London, on April 10, commencing at 7 p.m. Mr. F. H. D. Page, O.B.E., M.Inst.C.E. (Signal & Telegraph Engineer, Great Western Railway), has kindly agreed to initiate a discussion on "Points of Contact between Permanent Way and Signalling." Those members who inspected the G.W.R. Signal Engineer's Depot at Reading last May, may recollect that Mr. Page suggested that it would be advantageous if permanent-way men could have an opportunity of hearing how their problems also concerned the signal engineer's staff. The direct outcome of that proposal is the meeting announced above, which is being held jointly with the Institution of Railway Signal Engineers.

Railway Air Services Accident near Belfast.—A Railway Air Services DH.89 aircraft crashed in thick fog on the Royal County Down golf course, Craigavid, Northern Ireland, on April 1, while on a flight from Liverpool to Belfast. The

L.M.S.R. Ancoats (Manchester) Canteen

Mr. H. P. Aggleton, District Goods Manager, L.M.S.R., Manchester, shaking hands with Mr. W. Goodwin, Goods Agent, Ancoats, and Chairman of the Canteen Committee, after Mr. Aggleton had declared the canteen open

British and Irish Railway Stocks and Shares

Stocks	Highest 1945	Lowest 1945	Prices Apr. 2 1946	Prices Rise/Fall
G.W.R.				
Cons. Ord.	60¾	47½	55	—
5% Con. Pref. ...	124½	104½	111	—
5% Red. Pref. (1950)	107¾	101½	103	—
5% Rt. Charge ...	137½	120	126½	—
5% Cons. Guar. ...	135½	117	121½	—
4% Deb.	118	106	111	— ½
4½% Deb.	119½	108	112½	—
4½% Deb.	124½	111½	117	—
5% Deb.	138	124	127	—
2½% Deb.	83	74½	84½	—
L.M.S.R.				
Ord.	33	23¼	28	—
4% Pref. (1923) ...	65	50	54¼	—
4% Pref.	80¾	69½	76½	+ ½
5% Red. Pref. (1955)	106½	99½	101½	—
4% Guar.	106½	97	101½	—
4% Deb.	110½	102	105½	— ½
5% Red. Deb. (1952)	110½	103½	106½	—
L.N.E.R.				
5% Pref. Ord. ...	8½	5½	6	—
Def. Ord.	4½	2¾	3	—
4% First Pref. ...	62½	49½	53½	—
4% Second Pref. ...	33½	24¼	28½	—
5% Red. Pref. (1955)	103	96	97	—
4% First Guar. ...	104½	95	93	—
4% Second Guar. ...	97	89½	90	—
3% Deb.	91¾	82½	89	— 1½
4% Deb.	109¾	101	105½	— ½
5% Red. Deb. (1947)	103¾	100	100	—
4½% Sinking Fund Red. Deb.	106½	103	103½	—
SOUTHERN				
Pref. Ord.	79½	63	74½	—
Def. Ord.	27	20½	22½	—
5% Pref.	124½	104	110½	—
5% Red. Pref. (1964)	117	107	108½	—
5% Guar. Pref. ...	135¾	117	121½	—
5% Red. Guar. Pref. (1957)	117	106½	108½	—
4% Deb.	117	104½	109½	— 1½
5% Deb.	137	124	126½	—
4% Red. Deb (1962-67)	112	104½	106½	—
4% Red. Deb. (1970-80)	113½	104	107½	—
FORTH BRIDGE				
4% Deb	106	103	103	—
4% Guar.	106	101	102	—
L.P.T.B.				
4½ "A"	125	117	123½	—
5% "A"	135	127	133½	—
3% Guar. (1967-72)	100	97½	102	—
5% "B"	125½	115	117½	—
"C"	70	58	56	—
MERSEY				
Ord.	37	31½	31	—
3% Perp. Pref. ...	72½	68½	71	—
4% Perp. Deb. ...	104½	104	103	—
3% Perp. Deb. ...	84	78½	81	—
IRELAND*				
BELFAST & C.D.				
Ord.	8½	6	7½	—
G. NORTHERN				
Ord.	34	24½	38½	+ ½
Pref.	52½	42¾	59¾	—
Guar.	80	68	85½	—
Deb.	97½	87½	101	—
IRISH TRANSPORT				
Common	—	—	17/3	— 7½d.
3% Deb.	—	—	101	—

* Latest available quotation

OFFICIAL NOTICES

County Borough of Preston

RIBBLE NAVIGATION AND
PRESTON DOCK UNDERTAKING.

THE Corporation of Preston invite applications for the permanent appointment of ASSISTANT TRAFFIC MANAGER.

Applicants should have had experience in Dock and Railway Administration, knowledge of Dock and Railway Rates and Charges, Labour Negotiations, and the canvassing for and securing of traffic. Salary: £575 per annum, rising by annual increments of £25 to £650 (plus £59 16s. existing War Bonus). Canvassing either directly or indirectly will be a disqualification.

The person appointed will be required to pass a Medical Examination, and to contribute to the Council's Superannuation Fund. Applications, together with three recent testimonials (which will not be returned), should reach me not later than the first post on Tuesday, April 30th, 1946.

H. E. NUTTER,
Town Clerk.

Municipal Building,
Preston.

CIVIL ENGINEERING ASSISTANTS (Senior and Junior), experienced in surveying and levelling, design of structures, railway layouts, contract documents and bills, etc., required by Main Line Railway Company.

Engagements on temporary basis at from £7 7s. to £10 10s. per week, plus War Advance (at present 28s. per week), according to qualifications and experience.—Applications, stating age, experience, etc., with copies of recent testimonials, to Box No. 293, c/o *The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

YOUNG Mech. Engineer, A.M.I.M.E., adaptable—Works, Design and Commercial experience, incl. 2 yrs. Tech. Rep. and Service Engineer abroad, Loco. Precision Mechanism, etc.—desires changes and responsible post offering increased scope with possibilities of advancement. This country or overseas.—Replies to Box 4, *The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

APPLICATIONS invited by Brake Lining Manufacturers in North of England for a Sales Engineer. Commencing salary, £500 p.a. with good prospects. Age should not exceed 35. Qualifications: Apprenticeship in Motor Trade and Drawing Office experience. Associate Membership of Institution of Mechanical or Automobile Engineers preferred. Any knowledge of Railway Engineering an advantage.—Box 2, c/o *The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

SALES ENGINEER (RAILWAYS). Manufacturer establishing new diesel-electric locomotive division invites applications for appointment as Assistant Sales Manager or Senior Sales Engineer. Candidates should be graduates in electrical or mechanical engineering with subsequent experience in locomotive, carriage, diesel engine or electric railway engineering. Previous commercial experience essential and preference will be given to candidates with established connection with London representatives and consulting engineers of overseas railways. Salary, £1,000 upwards, according to qualifications. London location. Superannuation. Replies in strict confidence to Box 3, *The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

County Borough of Preston

RIBBLE NAVIGATION AND
PRESTON DOCK UNDERTAKING.

THE Corporation of Preston invite applications for the permanent appointment of CHIEF INSPECTOR.

The duties comprise the General Control of all Outdoor Traffic working involving the Supervision of all Loading and Discharging of Vessels, the handling of Goods on the Quays and in Warehouses, the control of all Dock Labour employed by the Corporation. Supervision of all Plant and Gear used in the handling of Goods and for seeing that all Dock Bye-Laws and Board of Trade Regulations affecting Docks and Railway Working are strictly observed. Salary: £460 per annum, rising to £510 by two annual increments of £15 and one of £20 (plus £59 16s. existing War Bonus). Canvassing either directly or indirectly will be a disqualification.

The person appointed will be required to pass a Medical Examination, and to contribute to the Council's Superannuation Fund. Applications accompanied by three recent testimonials (which will not be returned) to reach me not later than the first post on Tuesday, April 30th, 1946.

H. E. NUTTER,
Town Clerk.

Municipal Building,
Preston.

BRITISH WORK ON PERSIAN RAILWAYS. The achievements and difficulties of the R.Es. during the 15 months in which they laid the foundation for effective aid to Russia. Reprinted from *The Railway Gazette*, February 2 and 16, 1945. *Price* 1*s*. *Post free* 1*s*. 2*d*.

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crew of two and three passengers were killed. A fourth passenger, who was pulled clear of the burning wreckage by a steward of the golf club, was injured, and died later.

South African Railways & Harbours Mission Visit to G.W.R. Docks.—The special commission of senior railway officials of the South African Railways & Harbours Administration, which, as recorded in our March 15 issue, is at present touring Europe and North America, visited the Great Western Railway Docks at Cardiff and Swansea on March 26. The party was accompanied by Mr. L. E. Ford, Chief Docks Manager, Mr. H. H. Phillips, Assistant to the Superintendent of the Line, and Divisional Officers of the G.W.R. At Cardiff Docks the party inspected the railway layout, transit sheds, cold stores, and cranes. Later in the day the party carried out a thorough inspection of the railway and dock facilities at the Port of Swansea, including the electrical control arrangements for traffic working, and signalling arrangements. Some members inspected the locomotives recently converted to burn oil fuel.

Export of Government Surplus Machine Tools.—The increasing quantities of Government surplus machine tools becoming available for the re-equipment of British industry have enabled the Ministry of Supply & Aircraft Production to modify the conditions for export. The period of four months during which machines are on offer to British industrialists through the disposal centres is reduced to two months, and purchasers for export may acquire the machines at the same prices as users in the United Kingdom. The new arrangements, which come into force immediately, will enable exporters to re-establish trade abroad.

Roof Fire at Kings Cross, L.N.E.R.—Fire broke out on the roof over platforms 1 to 5 at Kings Cross Station, L.N.E.R., on March 29, while about 50 men were carrying out repair work on the roof. They all reached safety, unhurt. A section of roof about 200 ft. by 70 ft. was destroyed. The fire is believed to have been caused by an acetylene burner setting a tarpaulin sheet alight. Firemen climbed up scaffolding erected for the roof-repair work and crawled along the girders and planks, cutting away burning woodwork, while hoses played around them. Ten fire engines were used, and the fire was soon under control. Some burning material fell on the platforms, but little damage was done. Train services were only slightly disrupted.

G.W.R. Easter Train Plans.—The G.W.R. Easter programme will include the running of a number of reliefs to the ordinary main-line expresses throughout the system. The peak day will be Thursday, April 18, when from Paddington alone 61 long-distance trains will leave for all parts of the system. This is 18 above the normal daily departures. Among trains to be duplicated will be the "Cornish Riviera Express." On other days of the holiday, services will be as follows:—

Friday: Sunday service, with adjustment of local services as required.

Saturday: Normal Saturday service, with cancellation of some workmen's and early morning business trains.

Sunday: Normal Sunday services.

Monday: Ordinary Monday services, with cancellation of some workmen's and early morning business trains. Evening services will be strengthened and reliefs run.

Tuesday: Ordinary Tuesday services, with relief trains in the evening.

Presentation to Mr. H. E. O. Wheeler

Left to right: Mr. P. Nunn, O.B.E., London East Divisional Superintendent, Mr. H. E. O. Wheeler, O.B.E., M.V.O., formerly Deputy Traffic Manager, Mr. R. M. T. Richards, O.B.E., Traffic Manager, and Mr. S. A. Fitch, O.B.E., Assistant Superintendent of Operation, at the presentation to Mr. Wheeler on his retirement from the Southern Railway

Forthcoming Meetings

April 10 (*Wed.*).—The Permanent Way Institution (London Section), at the Ball Room, Charing Cross Hotel, London, W.C.2, 7 p.m. "Points of Contact Between Permanent Way and Signalling," by Mr. F. H. D. Page, M.Inst.C.E. (G.W.R.).

Railway Stock Market

The calmer international situation was reflected by steadier conditions in stock markets, which were featured by strength of British Funds, although in other sections the volume of business showed further contraction. Industrials recorded small irregular movements; attention was centred on Tuesday's Budget. Although anticipations are not pitched very high, hopes persist of some reduction in the taxation burden: but on the other hand, sentiment has continued to be affected by market talk of the possibility of a new scheme for dividend limitation. Iron and steels became easier on revived fears that the industry may not be outside Government nationalisation projects. United Steel, Colvilles, Hadfields, Dorman Long and Stewarts and Lloyds all moving moderately lower. Results of some companies in the heavy industries are reflecting the drying up of war contracts and the transition to peacetime production; but in most cases a compensating factor has been provided by lower tax charges. An outstanding example was the big decline in trading profits of the English Steel Corporation, which, however, was counterbalanaced by lower tax provision, leaving net profits slightly higher and the dividend unchanged at 17½ per cent., tax free. Generally, stock markets have shown a much better undertone than might have been expected, bearing in mind the combination of international and Budget uncertainties.

Home rails continued to provide a notably steady section and prices were well maintained on balance although demand was on very moderate lines, and prior charges failed to respond to the rising trend of British Funds.

There have been no fresh developments in the railway position as viewed from the angle of stockholders. Indeed, there is disappointment in the City that nothing further has been heard of the drawing up of alternative plans to nationalisation, although it is realised that the railway companies and other transport interests are not idle in this important matter. It is hoped, however, that progress in this connection will be as rapid as possible, because it is apparent that alternative plans to nationalisation will have to be before the public before the Government's Bill is presented.

There are so many uncertain factors to be taken into account in assessing the position of home railway stocks that it is perhaps not surprising investors are so far not attracted, despite the confident belief that a fair compensation basis for stockholders would show junior stocks to be considerably undervalued at current levels. Nevertheless, the steady undertone ruling in home rails since publication of the financial results, contrasts with the somewhat sharp movements shown in the last half of 1945, and the prevailing market view is that, over a period, junior stocks are more likely to show good improvement in value than move to lower levels.

Great Western at 55 has been well maintained on balance, and the 5 per cent. preference remained at 111, although a fractional decline to 111½ was shown by the 4 per cent. debentures. L.M.S.R. at 27⅞ was within ¼ of a week ago; the senior preference strengthened from 76 to 76¼, and the 1923 preference from 54 to 54¼; the 4 per cent. debentures, however, eased to 105½. L.N.E.R. second preference has been firm at 28, and the first preference kept at 53½; but debentures appeared less firm, the 3 per cents. at 88½ and the 4 per cents. at 105½ showing fractional declines. Southern deferred was maintained at 22¼ and the preferred at 75, while London Transport "C" was steadier and unchanged on balance at 56.

Result of the Argentine election had little influence on Argentine rails, but sentiment later was adversely affected by the news that the railways will not be granted any further concessions to operate road services. Ordinary stocks declined fractionally but preference stocks were steady, and after receding, quiet buying helped debenture stocks. Buenos Ayres Great Southern receded to 9¼; the 5 per cent. preference firmed up to 22½, and the 4 per cent. debentures at 61¼ regained most of an earlier decline. Buenos Ayres & Pacific consolidated debentures were better at 56½, also the 1912 debentures at 40½, while Central Argentine 4 per cents. and 5 per cent. improved to 55 and 59 respectively, although Entre Rios 4 per cents. lost ground at 57½. In other directions, Mexican Railway 6 per cent. debentures receded to 50 and United of Havana 1906 debentures were no better than 16½. Canadian Pacific ordinary stock has been steadier at 24½ with the preference stock firm at 77.

Traffic Table and Stock Prices of Overseas and Foreign Railways

	Railways	Miles open	Week ended	Traffic for week: Total this year	Traffic for week: Inc. or dec. compared with 1944/5	No. of Weeks	Aggregate traffics to date: Totals 1945/6	Aggregate traffics to date: Totals 1944/5	Aggregate traffics to date: Increase or decrease	Shares or Stock	Prices: Highest 1945	Prices: Lowest 1945	Prices: Apr. 2, 1946
				£	£		£	£	£				
South & Central America	Antofagasta	834	24.3.46	35,610	+ 2,520	12	397,590	367,820	+ 29,770	Ord. Stk.	12	8¾	9½
	Arg. N.E.	753	16.3.46	ps.313,900	+ ps., 28,700	37	ps.10,976,100	ps.10,992,100	— ps.15,200	,,	10	5¾	5
	Bolivar	174	Feb., 1946	4,380	— 615	8	9,206	10,638	— 1,432	6 p.c. Deb.	8½	5½	6¼
	Brazil	—	—	—	—	—	—	—	—	Bonds	25	17	25
	B.A. Pacific	2,771	23.3.46	ps.2,532,000	— ps. 118,000	38	ps.86,122,000	ps.81,769,000	+ ps.4,353,000	Ord. Stk.	7	5	5½
	B.A.G.S.	5,080	23.3.46	ps.4,305,000	+ ps.635,000	38	ps133,969 000	ps.126,674,000	+ ps.7.295,000	Ord. Stk.	13⅜	10½	9½
	B.A. Western	1,924	23.3.46	ps.1,077,000	+ ps.228,000	38	ps. 45,699,000	ps.43.265,000	+ ps.2,434,000	,,	12¾	9½	9½
	Cent. Argentine	3,700	23.3.46	ps.3,377,440	+ ps.423,340	38	ps119,618,157	ps.110,183,350	+ ps.9,434,807	,,	9¾	7	6¾
	Do.	—	—	—	—	—	—	—	—	Dfd.	5	2⅜	3½
	Cent. Uruguay	970	23.3.46	42,633	+ 1,458	38	1,473,034	1,299,999	+ 173,035	Ord. Stk.	7¼	4	6½
	Costa Rica	262	Feb., 1946	26,912	+ 1,297	34	222,104	172,502	+ 49,602	Stk.	16½	13	12½
	Dorada	70	Feb., 1946	28,065	+ 1,388	8	59,814	58,605	+ 1,209	1 Mt. Deb.	103	102	101½
	Entre Rios	808	23.3.46	ps.403,700	+ ps.17,700	38	ps 16,167,900	ps.15,020,600	+ ps.1,147,300	Ord. Stk.	7½	4½	6
	G.W. of Brazil	1,030	23.3.46	31,000	+ 4,200	12	382,000	333,000	+ 49,000	Ord. Stk.	30/-	23/6	20/-
	Inter. Ctl. Amer.	794	Feb., 1946	$899,699	+ $148,466	8	$1,924,216	$1,482,373	+ $441,843	—	—	—	—
	La Guaira	22¾	Mar., 1946	4,421	— 972	12	16,850	15,910	+ 940	5 p.c. Deb.	78	70	61½
	Leopoldina	1,918	23.3.46	63,936	+ 19,071	12	678,453	540,842	+ 137,611	Ord. Stk.	4¼	3½	3⅜
	Mexican	483	21.3.46	ps.825,900	+ ps.187,900	11	ps. 9,365,900	ps. 7,001,600	+ ps. 2,364,000	Ord. Stk.	¼	¼	1
	Midland Uruguay	319	Feb., 1946	12,941	— 5,801	33	147,430	138,980	+ 8,450	—	—	—	—
	Nitrate	382	31.3.46	9,503	+ 1,056	12	57,202	36,225	+ 20,977	Ord. Sh.	75 6	67/6	78/9
	N.W. of Uruguay	113	Feb., 1946	3,791	— 911	32	44,609	45,207	— 598	—	—	—	—
	Paraguay Cent.	274	22.3.46	£61,934	— £178	38	£2,299,544	£2,256,898	+ £42,646	Pr. Li.Stk.	79⅞	77	75½
	Peru Corp.	1,059	Feb., 1946	138,395	+ 21,244	34	1,134,456	1,032,102	+ 102,354	Pref.	10⅜	7⅞	9⅛
	Salvador	100	Feb., 1946	£ 233,000	+ £ 27,000	32	£ 1,080,000	£ 957,000	+ £ 123,000	—	—	—	—
	San Paulo	153½	—	—	—	—	—	—	—	Ord. Stk.	60¾	50½	51
	Taltal	156	Feb., 1946	5,315	+ 3,230	34	24,490	20,045	+ 4,445	Ord. Sh.	17/-	10/6	16/3
	United of Havana	1,301	23.3.46	102,722	+ 25,158	38	2,007,773	2,016,949	— 9,176	Ord. Stk.	3	1	2
	Uruguay Northern	73	Feb., 1946	1,477	— 436	33	14,090	12,457	+ 1,633	—	—	—	—
Canada	Canadian National	23,569	Feb., 1946	5,771,000	— 475,800	8	11,951,200	12,759,400	— 808,200	—	—	—	—
	Canadian Pacific	17,037	21.3.46	1,184,200	+ 14,000	11	12,650,600	12,878,800	— 228,200	Ord. Stk.	24	14⅜	24½
Various	Barsi Light†	202	Feb., 1946	30,465	+ 10,365	45	278,032	243,082	+ 34,950	Ord. Stk.	131	123	115½
	Beira	204	Jan., 1946	69,229	— 8,862	16	274,482	314,277	— 39,795	—	—	—	—
	Egyptian Delta	607	22.2.46	18,343	— 2,696	39	514,206	570,041	— 55,835	Prf. Sh.	10	8⅛	6
	Manila	—	—	—	—	—	—	—	—	B. Deb.	71	55½	70½
	Mid. of W. Australia	277	Jan., 1946	17,786	— 1,859	28	118,260	139,946	— 21,686	Inc. Deb.	97½	85	80
	Nigeria	1,900	Jan., 1946	364,084	— 31,234	42	2,794,107	3,133,455	— 339,348	—	—	—	—
	Rhodesia	2,445	Jan., 1946	491,378	— 15,492	16	2,009,946	2,068,980	— 59,034	—	—	—	—
	South African	13,301	23.2.46	1,015,836	+ 7,532	50	47,739,779	43,734,644	+ 4,005,115	—	—	—	—
	Victoria	4,774	Nov., 1945	1,252,024	— 55,618	—	—	—	—	—	—	—	—

† Receipts are calculated @ 1s. 6d. to the rupee